

UC Office of the President

ITS reports

Title

Learning to Collaborate: Lessons Learned from Governance Processes Addressing the Impacts of Sea Level Rise on Transportation Corridors Across California

Permalink

<https://escholarship.org/uc/item/4rn5j20d>

Authors

Vantaggiato, Francesca, PhD
Lubell, Mark, PhD

Publication Date

2020-05-01

DOI

10.7922/G2ZS2TSX



Learning to Collaborate: Lessons Learned from Governance Processes Addressing the Impacts of Sea Level Rise on Transportation Corridors Across California

A Research Report from the University of California Institute of Transportation Studies

Francesca Vantaggiato, Assistant Professor, Public Policy, King's College London, United Kingdom (formerly Postdoctoral Researcher, Center for Environmental Policy & Behavior, University of California, Davis)

Mark Lubell, Professor, Center for Environmental Policy & Behavior, University of California, Davis

May 2020

Technical Report Documentation Page

1. Report No. UC-ITS-2019-25	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A	
4. Title and Subtitle Learning to Collaborate: Lessons Learned from Governance Processes Addressing the Impacts of Sea Level Rise on Transportation Corridors Across California		5. Report Date May 2020	
		6. Performing Organization Code ITS-Davis	
7. Author(s) Francesca Vantaggiato, PhD, https://orcid.org/0000-0003-1154-4540 Mark Lubell, PhD, https://orcid.org/0000-0001-5757-7116		8. Performing Organization Report No. UCD-ITS-RR-20-40	
9. Performing Organization Name and Address Institute of Transportation Studies, Davis 1605 Tilia Street, Suite 100 Davis, CA 95616		10. Work Unit No. N/A	
		11. Contract or Grant No. UC-ITS-2019-25	
12. Sponsoring Agency Name and Address The University of California Institute of Transportation Studies www.ucits.org		13. Type of Report and Period Covered Final Report (October 2018 – April 2020)	
		14. Sponsoring Agency Code UC ITS	
15. Supplementary Notes DOI:10.7922/G2ZS2TSX			
16. Abstract <p>This study was designed to identify lessons learned from experiences of multi-stakeholder collaboration in governance processes focused on adaptation to sea level rise for specific transportation corridors/assets across different areas of California. Four transportation assets in California were selected as case studies: State Route 37 in the Bay Area; the Cardiff Beach Living Shorelines Project and the LOSSAN railroad at Del Mar in San Diego County; and the Port of Long Beach in Los Angeles County. The study methods included attendance of policy meetings; document analysis; and interviews of staff at (local, regional, and state) government bodies, transportation agencies, climate collaboratives, etc. The study identified three major governance challenges shared among these cases: (1) stakeholder involvement or collaboration with ‘unusual’ partners; (2) jurisdictional fragmentation; and (3) lack of funding. The lessons learned to address these challenges were: (a) include a wide range of stakeholders early on in the project; (b) identify an intermediary or facilitator with relevant knowledge and social capital with the stakeholders; (c) establish a forum for negotiations and information exchange; (d) draft a memorandum of understanding with the rules of collaboration; (e) appoint a project manager to tie all the project parts and stakeholders together and sustain engagement; (f) structure the collaboration in tiers from technical/operational to executive/political; (g) explore options to make any given project a multi-benefit project; (h) advocate for a multi-year stream of funding rather than a lump sum; (i) leverage collaboration for funding and highlight, to potential funders, the collaborative element as a means to increase the efficiency of their investment. Issues to consider when deriving lessons from other jurisdictions were: differences in capacity, or available resources and staff; the numbers of actors involved; pre-existing positive collaborative relationships between the actors; exposure of transportation assets to sea-level rise; existing vulnerabilities of the corridor/asset; and the economic relevance of the corridor/asset.</p>			
17. Key Words Governance, consensus, stakeholders, cooperation, interorganizational relations, transportation corridors, sea level, climate change, case studies		18. Distribution Statement No restrictions.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 65	22. Price N/A

About the UC Institute of Transportation Studies

The University of California Institute of Transportation Studies (UC ITS) is a network of faculty, research and administrative staff, and students dedicated to advancing the state of the art in transportation engineering, planning, and policy for the people of California. Established by the Legislature in 1947, ITS has branches at UC Berkeley, UC Davis, UC Irvine, and UCLA.

Acknowledgements

This study was made possible through funding received by the University of California Institute of Transportation Studies from the State of California via the Public Transportation Account and the Road Repair and Accountability Act of 2017 (Senate Bill 1). The authors would like to thank the State of California for its support of university-based research, and especially for the funding received for this project. The authors would also like to thank the staff of the Institute of Transportation Studies for their support throughout the life of this project. The authors would also like to wholeheartedly thank all the interviewees and organizations that took part in this research for the time they dedicated to this project and their willingness and openness to share their experiences of collaboration. Finally, the authors would like to thank all workshop participants for adapting to the changes in workshop format and delivery imposed by the COVID-19 pandemic.

Disclaimer

The contents of this report reflect the views of the author(s), who are responsible for the facts and the accuracy of the information presented herein. This document is disseminated under the sponsorship of the State of California in the interest of information exchange. The State of California assumes no liability for the contents or use thereof. Nor does the content necessarily reflect the official views or policies of the State of California. This report does not constitute a standard, specification, or regulation.

Learning to Collaborate: Lessons Learned from Governance Processes Addressing the Impacts of Sea Level Rise on Transportation Corridors Across California

UNIVERSITY OF CALIFORNIA INSTITUTE OF TRANSPORTATION STUDIES

May 2020

Francesca Vantaggiato, Assistant Professor, Public Policy, King's College London, United Kingdom (formerly Postdoctoral Researcher, Center for Environmental Policy & Behavior, University of California, Davis)

Mark Lubell, Professor, Center for Environmental Policy & Behavior, University of California, Davis

[page intentionally left blank]

TABLE OF CONTENTS

Glossary.....	iv
Executive Summary	v
1 Introduction	1
2 The Case Studies.....	4
2.1 The Bay Area	6
2.2 San Diego County	13
2.3 Los Angeles County.....	24
3 Lessons Learned	28
3.1 Early Engagement.....	30
3.2 Jurisdictional Fragmentation	31
3.3 Lack of Funding.....	32
3.4 Issues to Bear in Mind When Learning from Other Jurisdictions	32
4 SB1 Recipients in the Three Regions	34
4.1 Marin County & San Mateo County	34
4.2 SANDAG	35
4.3 SCAG	36
5 Workshop Summary	39
5.1 Attendees' discussion groups.	39
5.2 Progress made by SB1 grant recipients.	42
6 Conclusions	43
References.....	45
Appendix	48
List of interviewees.....	48
Workshop Agenda	51
Workshop Participants by organizational affiliation	52

List of Tables

Table 1. Key findings from this research.....	vii
Table 2. Characteristics of the four case studies.....	4
Table 3. Key findings from this research.....	29
Table 4. List of organizations interviewed for this research.....	48
Table 5. List of policy meetings attended for this research.....	50

List of Figures

Figure 1. SR37 projected flooding at 10ft sea level rise	7
Figure 2. SR37 bottlenecks (Abbreviations: WB, west bound; EB, east bound).	8
Figure 3. SR37 corridor split in 3 segments.	10
Figure 4. Living Shorelines project location in Encinitas, San Diego.	16
Figure 5. LOSSAN railroad at Del Mar projected flooding at 10ft sea level rise	21
Figure 6. Port of Long Beach flooding at 10ft sea level rise	26

Glossary

LOSSAN	Los Angeles-San Diego-San Luis Obispo
MPO	Metropolitan Planning Organization
NCTD	North County Transit District
OPC	Ocean Protection Council
SANDAG	San Diego Association of Governments
SB1	State Bill 1
SCAG	Southern California Association of Government
SCC	California State Coastal Conservancy
SR37	State Route 37
USACE	United States Army Corps of Engineers

Executive Summary

The consequences of climate change are increasingly visible and tangible, particularly at local and regional levels. In California, sea level rise represents a pressing issue for transportation policy, given the numerous critical transportation infrastructure assets along California's coasts and bays. There is no entity charged with addressing sea level rise. Rather, existing transportation agencies at regional and local level need to consider sea level rise into their planning decisions, and address bottlenecks in permitting and funding. Policy for sea level rise is informed by scientific knowledge: policy-makers consult predictions of future sea levels at different points in time, corresponding to predicted inundation levels, in order to future-proof their shorelines. Policy-makers in California have an array of sources of climate science at their disposal (Lubell 2011). Moreover, they often look for examples of infrastructural solutions for sea level rise that have been successfully implemented in other states and countries across the world (Lubell 2017).

One of the main challenges posed by sea level rise, from a governance perspective, is its novelty (Dolšák and Prakash 2018). There is no rule book for adaptation. Adaptation to sea level rise requires agencies and stakeholders to set aside their 'ways of doing things' and move into uncharted territory, both from a planning, engineering, and design perspective and from a governance perspective. This requires them to collaborate, both horizontally (i.e., with actors placed at the same level of governance) and vertically (i.e., with actors placed at different levels of governance). However, collaboration is easier said than done: governance challenges are the main barriers to climate adaptation in metropolitan regions (Ekstrom and Moser 2014). Yet, whereas sources of scientific knowledge and technical options are available, there is little investigation concerning successful examples of collaboration. What makes collaboration work?

This report outlines the results of a research project aimed at discovering whether and how governance actors in different areas of California are collaborating to address the threats to transportation posed by sea level rise, and what they can learn from each other's experiences.

We adopted a 'policy learning' perspective focused both on the outcomes of the collaboration and the collaboration process itself. Typically, collaborative governance processes involve two types of learning: knowledge acquisition and belief change. Learning of both forms only occurs, however, when partnerships are perceived as fair, when diverse stakeholders are involved, and when involved participants trust each other (Leach, Weible et al. 2013). Therefore, successful collaboration (where 'success' means that learning has occurred and consensus has been achieved) depends on establishing collaborative partnerships with these characteristics. This research investigated collaborative processes in California focused on transportation corridors to distil lessons learned for collaboration.

This report and the lessons described herein are primarily aimed at transportation agencies at local, regional, and state levels, as well as staff that coordinates climate collaboratives such as the Alliance of Regional Collaboratives for Climate Adaptation. In this report, we refer to these actors collectively as 'public managers.' In metropolitan regions of California, collaboration and

coordination for addressing sea level rise expected to affect transportation have already started and focus on specific transportation assets. How do these experiences differ across regions? What can public managers learn from them?

The project considered the three most populous areas of the state (i.e., the San Francisco Bay Area, Los Angeles County, and San Diego County) and, within each, focused on specific transportation corridors/assets, that were selected according to three criteria:

- 1) the corridor/asset is vulnerable to sea level rise;
- 2) there are no easily accessible alternative routes to it;
- 3) there is/has been a governance process focused on adaptation to sea level rise for the corridor/asset.

The final selection of cases considered includes:

- 1) State Route 37 (San Francisco Bay Area);
- 2) The Cardiff Beach Living Shorelines Project (Highway 1 at Encinitas, San Diego County)
- 3) The LOSSAN railroad at Del Mar (San Diego County)
- 4) The Port of Long Beach (Los Angeles County).

This study was made possible through funding received by the University of California Institute of Transportation Studies from the State of California via the Public Transportation Account and the Road Repair and Accountability Act of 2017 (Senate Bill 1), which was signed into law on April 28, 2017. We responded to a Request for Proposals for SB1 research grants for the year 2018/2019. We framed our project as fitting under topic area ‘Environment, energy, health, and transportation,’ priority ‘Increase transportation system resilience in response to a changing climate,’ under the assumption that addressing governance challenges successfully is key to successfully adapting to the consequences of climate change.

In an effort to maximize the impact of the grant, we reached out to local and regional governance actors who had been awarded SB1 funding in 2018 to address cross-jurisdictional challenges collaboratively in each of the three regions. We sought to investigate what they expect their key governance challenges to be in the future, and how they plan to address them. These are the transportation projects funded by SB1 in Marin and San Mateo County in the San Francisco Bay Area; the development of the Southern California Association of Government adaptation framework in Los Angeles county; and the development of the San Diego Association of Governments adaptation framework in San Diego County.

This research builds upon previous research by the authors on the governance challenges associated with sea level rise in the San Francisco Bay Area (see Governance Gap report, 2017). It differs from that research in four respects: its focus on transportation policy, its analysis of local on-the-ground governance processes, its policy learning rationale, and its comparative research design. The data collection process consisted of 31 face-to-face interviews with public

managers from each region, observant participation of policy meetings, and document analysis (see appendix for a list of interviewees).

Table 1 reports the key findings from this project. The first column focuses on the challenges encountered across cases and should serve to prepare public managers to the issues that they are likely to confront once they start working on adaptation to sea level rise in the transportation sector.

The second column focuses on the lessons learned, and these are meant to inform practice; they provide an overview of practical solutions that public managers can implement to address governance challenges. These solutions have either already been implemented in specific cases and have yielded satisfactory results or they have not been implemented and interviewees think that they should have been.

The third column focuses on the issues that public managers should bear in mind when they examine the policy outputs and outcomes of other jurisdictions and assess their applicability in their own jurisdiction, because these issues affect the ability of public managers to kickstart collaborative processes. The first three issues describe the complexity of the governance system and the resources available to public managers. The last three issues affect stakeholders' perceptions of the urgency of the collaboration.

Table 1. Key findings from this research

Governance challenges	Lessons learned from the case studies	Issues to bear in mind when deriving lessons from other jurisdictions
1. Stakeholder involvement or "collaboration with 'unusual' partners"	<ol style="list-style-type: none"> 1. Include a whole range of relevant agencies and stakeholders into the governance process early on; 2. Identify an intermediary and/or facilitator who has knowledge of the relevant actors and pre-existing social capital with them; 3. Establish a coordination forum where negotiations and exchange of information can occur; 4. Collectively draft a memorandum of understanding to lay down the rules of collaboration. 	<p>Capacity: resources and staff available to transportation agencies;</p> <p>Number of actors involved from each level of governance;</p> <p>Presence of pre-existing positive collaborative relationships between the actors involved;</p> <p>Exposure of transportation assets to sea level rise;</p> <p>Existing vulnerabilities of the corridor/asset;</p> <p>Economic relevance of the corridor / asset.</p>

Governance challenges	Lessons learned from the case studies	Issues to bear in mind when deriving lessons from other jurisdictions
2. Jurisdictional fragmentation	<ol style="list-style-type: none"> 1. Establish a coordination forum where negotiations and the exchange of information can occur; 2. Identify an intermediary and/or facilitator who has knowledge of the relevant actors and pre-existing social capital with them; 3. Appoint a project manager to tie all the project parts and stakeholders together and sustain engagement; 4. Structure the collaboration in tiers from technical/operational to executive/political so that issues can be dealt with at the appropriate level. 	
3. Lack of funding	<ol style="list-style-type: none"> 1. Explore options to make the project a multi-benefit project; 2. Advocate for a multi-year stream of funding rather than a lump sum; 3. Leverage collaboration for funding: evidence of collaboration suggests to funding bodies they are making an efficient investment. 	

This report comprises four parts. The first section is an introduction to the project and the report. The second delves into the empirical case studies. The third discusses the governance challenges and the lessons learned from the empirical case studies. The fourth section briefly outlines the projects that have received SB1 funding in each of the three areas, and the grantees' plans for addressing upcoming governance challenges. The fifth section consists of a summary of the project workshop, which took place on April 23, 2020 via videoconference. A short conclusions section ends the report.

1 Introduction

Sea level rise is a growing concern for coastal communities in California. Flooding and erosion, exacerbated by rising sea levels, hamper the viability of transportation and other critical infrastructure along California's coasts and bays. Moreover, the operations of key transportation assets such as ports and airports are vulnerable to disruption caused by flooding due to sea level rise. Transportation assets are networked and therefore, interdependent; besides considering the vulnerabilities of the assets under their jurisdiction, actors need to consider how vulnerabilities in other parts of the transportation network might affect their operations.

Climate adaptation generally and sea-level rise adaption specifically involves land-use and transportation decisions that affect multiple jurisdictional levels. These decisions involve many stakeholders, including local, regional, county, state and federal agencies, non-governmental organizations, and individual citizens. Adapting transportation infrastructure to sea-level rise requires collaboration among these actors. In practice, collaboration means not only leveraging existing relationships with 'traditional' or 'usual' partners, but also forging relationships with 'new' agencies and stakeholders. This is a challenging task, given that different agencies, stakeholders, and local governments have different mandates and priorities, which imply different ways of looking at the common issue of adaptation to sea level rise. Therefore, collaboration entails 'breaking up silos.' This is a noble policy goal, which is asserted widely but rarely followed by practical suggestions. This report aims at providing a policy perspective on collaboration.

The research project underlying this report was framed around the idea of 'learning.' Adaptation to sea level rise straddles two types of policy learning: epistemic (learning from scientists) and reflexive (learning by dialogue among policy process participants) (Dunlop and Radaelli 2018). Currently, in California, epistemic learning is supported by climate and engineering research about the potential vulnerability to sea level rise and coastal flooding (Wang, Stacey et al. 2018), along with potential "green" and "gray" infrastructure solutions that could enhance the adaptive capacity of transportation (SFEI Atlas 2019). However, epistemic learning is not sufficient for the type of policy learning that is needed to overcome governance challenges (Weible, Heikkila et al. 2018). Policy actors must also engage in reflexive learning, which builds coordination knowledge over time, through "collective puzzling" (Heclo 1974). Reflexive learning holds the highest conflict potential, as the plurality of interests diverge (Bennett and Howlett 1992); however, it also displays the highest potential for actual policy change.

Learning among policy actors plays a key role in shaping whether and how actors come to agreement around their understanding of policy problems (Heikkila and Gerlak 2013). The necessity of reflexive learning is paramount in the case of sea-level rise and transportation, because actors participate in collaborative governance processes that draw on various knowledges to develop a common understanding (Folke, Hahn et al. 2005). Typically, collaborative governance processes involve both technical and social learning, meaning that

participants can interact frequently, exchange information from different sources, and build trust (Gerlak and Heikkila 2011). These practices should lead actors to establish shared goals, i.e., to achieve consensus and move forward (Gerlak and Heikkila 2011).

Policy learning theory highlights the importance of comparative analysis across jurisdictions (Schmitt 2012). Policy-makers intuitively look at the approaches and solutions adopted by their colleagues in other jurisdictions, in order to make better informed decisions for their own jurisdiction. Often, policy solutions that appear successful in one geographic context cannot be readily applied in other contexts given ecological, economic, and institutional differences (Rose 1993). It then falls on the analyst to select cases for comparison that are different/similar in empirically useful ways. We selected our cases based on three criteria:

- 1) the corridor/asset is vulnerable to sea level rise;
- 2) there are no easily accessible alternative routes to it;
- 3) there is/has been a collaborative governance process focused on adaptation to sea level rise for the corridor/asset.

We selected transportation assets and areas with a view to maximize variation in types of assets and level of exposure. State Route 37 (SR37) is an example of ongoing governance process involving four counties (horizontally cross-jurisdictional) with regional and state transportation agencies (vertically cross-jurisdictional); the Living Shorelines project is a nature-based adaptation solution implemented on Highway 1 at Encinitas in San Diego County, which is widely heralded as an example of successful governance process and involved several stakeholders from different levels of governance (vertically cross-jurisdictional); the LOSSAN railroad corridor at Del Mar was selected for its extreme vulnerability to sea level rise and its high economic and social relevance for the region and the country. Our fieldwork in the Los Angeles area revealed that there is little in the way of ongoing multi-stakeholder governance processes for transportation and sea level rise. We decided to focus on the case of the Port of Long Beach, which has produced its own vulnerability assessment and is the actor, among those we interviewed, that expressed the clearest intention to engage in collaboration with other actors to implement its adaptation strategy.

We collected empirical evidence via document analysis and a total of 31 face-to-face interviews with relevant stakeholders, and we focused on their perceptions of the governance problems linked to sea level rise in their respective local contexts and the solutions they have implemented.

Furthermore, we organized a policy workshop that was meant for public managers and stakeholders from the three regions to meet, hear each other's experiences and perspectives, and collectively reflect on the lessons learned from this project. The workshop took place on April 23, 2020 via videoconferencing with Zoom¹. We released our draft report to interviewees

¹ Initially scheduled to take place in person at the Institute for Transportation Studies premises in Davis (CA), the workshop had to be shifted online due to the social distancing and shelter-in-place rules imposed in response to the COVID-19 pandemic.

and invited workshop participants ahead of the workshop itself. The workshop used the report as a roadmap for presentations and discussion. Section 5 summarizes the key insights that emerged from the workshop.

2 The Case Studies

The purpose of this report is to present the challenges that stakeholders have encountered in planning for sea level rise, and the lessons that they have learned in the process.

The empirical cases presented in this section are:

- 4) State Route 37 in the San Francisco Bay Area;
- 5) Highway 1 at Encinitas in San Diego County (Cardiff Beach Living Shorelines project);
- 6) LOSSAN railroad at Del Mar in San Diego County;
- 7) The Port of Long Beach in Los Angeles County.

For each case, we outline the characteristics of the corridor or asset, the vulnerabilities it has to sea level rise, the main actors involved, their mandates and priorities, the collaboration process they were involved in, the challenges they faced, and, finally, the lessons they learned during the process.

Table 2 outlines the key characteristics of the four cases. It starts by outlining the types of assets considered, their ownership, and their economic significance. The broader economic relevance of the LOSSAN corridor and the Port of Long Beach is primarily due to their serving as points of entry for goods that are then sold throughout the US. Subsequent columns outline the main characteristics of the collaborative processes focused on these transportation assets and the main actors involved in them. At the time of this research (May 2019), the Port of Long Beach had not yet started any collaboration. However, since then the Port has been engaging in informal collaboration with the actors listed in the table under key actors; and intends to expand this list in the future. State Route 37 is the only corridor covering multiple local jurisdictions. All cases cross jurisdictions vertically, due to overlapping mandates in terms of ownership, operation, and maintenance of the corridor as well as land use authority. Therefore, all cases involve collaboration across levels of governance.

Table 2. Characteristics of the four case studies

	State Route 37	Living Shorelines	LOSSAN corridor	Port of Long Beach
Type of asset	Highway	Highway	Railroad	Port
Ownership	State Dept of Transportation (Caltrans)	City of Encinitas	North County Transit District	Port (trustees of State)
Economic relevance of corridor	Local to four counties	Local to City of Encinitas	Regional, State & Federal	Regional, State & Federal

	State Route 37	Living Shorelines	LOSSAN corridor	Port of Long Beach
Key actors	County governments, Metropolitan Transportation Commission, California Department of Transportation, US Fish and Wildlife, Bay Conservation and Development Commission	City of Encinitas, San Elijo Lagoon Conservancy, Coastal Conservancy, Coastal Commission, California Dept of Parks and Recreation	Transit District, San Diego Association of Governments (MPO), City of Del Mar, Port of San Diego, Coastal Commission	Port of Long Beach, City of Long Beach, Port of Los Angeles, State Lands Commission, US Army Corps of Engineers, Coastal Commission
Stage of collaborative process	Advanced (Policy Committee)	Advanced (Project Team)	Early (working group 1 st meeting in Jan 2020)	Early (informal collaboration, no MoU or working group in place as yet)
Collaborative arrangements	Tiered-structure & MoU	MoU	Working Group	Informal dialogue
Start of collaboration	2015 – present	2015 – present ²	2020 – present	2019 – present
Cross-jurisdictional (cross local govts)	Yes	No	No	No
Cross-jurisdictional (cross levels of governance)	Yes	Yes	Yes	Yes
Pre-existing flooding/erosion independent of sea level rise	Yes	Yes	Yes	No
Exposure of assets to consequences of sea level rise	High	High	High	Intermediate

² The Living Shoreline project has been completed, but collaboration continues for the monitoring of the sand dunes erosion.

2.1 The Bay Area

The Bay Area has a long standing tradition of collaboration and coordination concerning environmental issues (Vogel 2018). Through time, this collaboration has featured different coalitions of interest depending on the issue at stake (Vogel 2018). The Bay Area benefits from a reservoir of support for regional governance (Lewis and Sprague 1997), including in transportation matters. This is best shown by voters' approval of regional measures increasing tolls on state-owned bridges in the region (e.g., Regional Measures 1 in 1988, 2 in 2004, and 3 in 2018) or passing parcel taxes to fund habitat restoration projects (including flood protection projects having a restoration component) and ensure shoreline access, such as Measure AA in 2016.

At the same time, the Bay Area is a region of decentralized governance comprising 9 counties and 101 cities. Therefore, in transportation planning, the Bay Area faces the common challenges of regional governance in California: the inability to tie transportation plans and investments to land use decision-making, which remains firmly at the local level.

2.1.1 State Route 37

State Route 37 (SR 37) is 21 miles long and passes through the expansive marshes of the North San Francisco Bay, providing commuters, tourists, and trucks a path between I-80 in Solano County and highway 101 in Marin County. It stretches across four counties—from east to west. These are the counties of Solano, Napa, Sonoma, and Marin. In 2017, SR 37 experienced temporary flooding due to winter storms, which raised the political visibility of the road and the urgency of its vulnerability to flooding. In winter 2019, the road flooded again a mile east of where it did in 2017, causing again severe negative impacts on traffic. As a matter of fact, sea level rise is projected to considerably worsen the vulnerability of SR37, enhancing the frequency of flooding to a point where most of the existing roadway is permanently inundated (see Figure 1³). Traffic on the corridor would need to divert to other longer and already congested routes, increasing travel time.

Moreover, SR37 traverses the largest remaining San Francisco Bay marshlands, which are similarly threatened by sea level rise; critical habitats for protected species, wetlands, and baylands, could be significantly altered. Growing housing demand in the North Bay counties has produced a housing market that a high percentage of households cannot afford. Consequently, many citizens have to live far away from their jobs. This jobs/housing imbalance is one cause of congestion on SR 37. The road has a specific commuting pattern: east-west in the morning, as workers commute to work in Sonoma or Marin, and west-east in the evening, as workers drive

³ The maps in Figures 1, 4 and 5 rely on data from Barnard, P.L., Erikson, L.H., Foxgrover, A.C., Limber, P.W., O'Neill, A.C., and Vitousek, S., 2018, Coastal Storm Modeling System (CoSMoS) for Southern California, v3.0, Phase 2 (ver. 1g, May 2018): U.S. Geological Survey data release, <https://doi.org/10.5066/F7T151Q4> (last accessed 2 April 2020). The figures consider static sea-level rise of 10 feet above mean higher high water (MHHW), which is the worst case scenario envisaged to occur by 2100 in the Sea level rise guidance of the Ocean Protection Council http://www.opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf (last accessed 2 April 2020).

back home to Napa and especially Solano County⁴. The road is owned by Caltrans, who owns and manages the state highways. The counties crossed by SR37 have a role in oversight and funding.

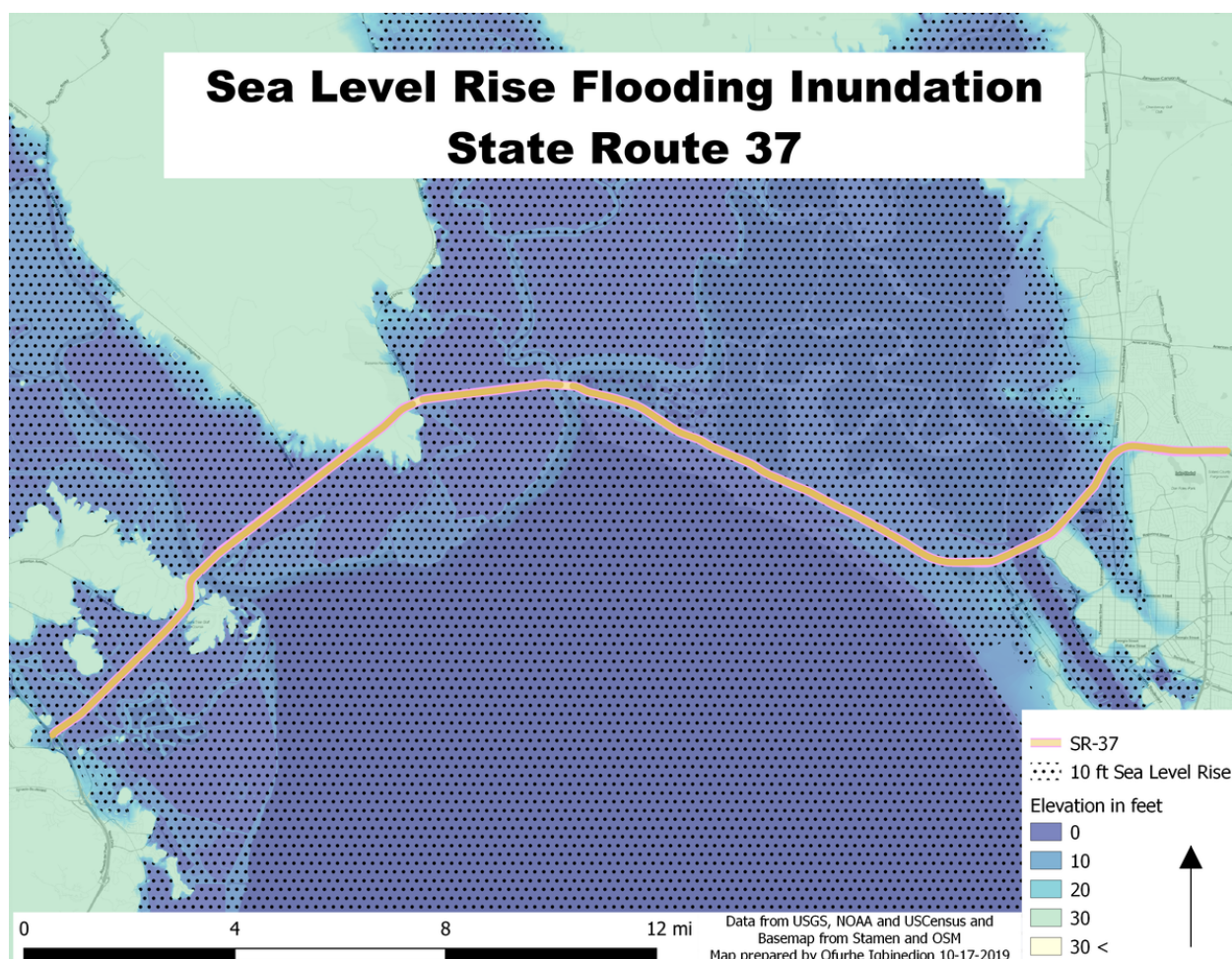


Figure 1. SR37 projected flooding at 10ft sea level rise

The key actors in the governance process concerning SR37 are: Caltrans; the Metropolitan Transportation Commission, which serves as the Metropolitan Planning Organization (MPO); the four county transportation authorities; environmental stakeholders such as the Coastal Conservancy, the San Francisco Estuary Institute, the Audubon Society; and permitting agencies at various levels of governance, e.g., the Bay Conservation and Development Commission, the US Fish and Wildlife Service, the US Army Corps of Engineers; and the list goes on. These key actors have been meeting for several years within the framework of a Policy Committee, whose visibility has grown in time and is the crucial venue of collaboration for the corridor. The public meetings of the Committee are attended by a wide variety of stakeholders.

⁴ SCTA, Highway 37, <https://scta.ca.gov/projects/highway37/#1569435164200-9e1b5c9f-c579> (last accessed 2 April 2020)

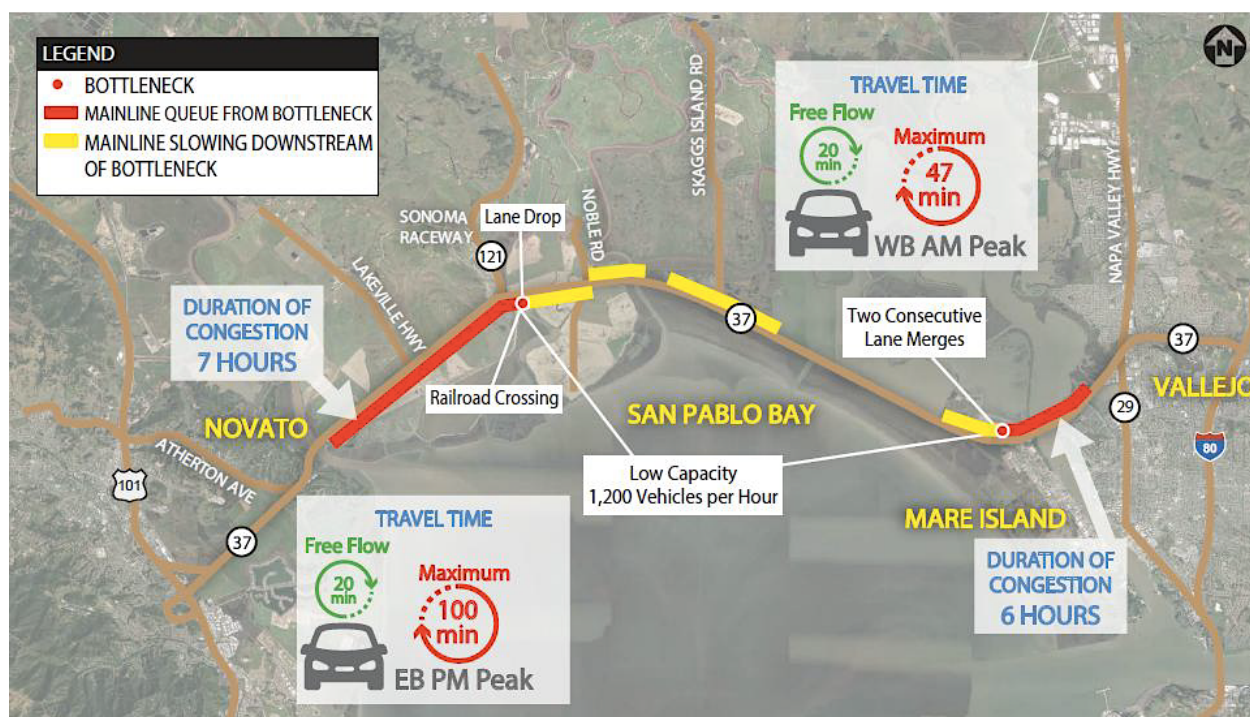


Figure 2. SR37 bottlenecks (Abbreviations: WB, west bound; EB, east bound). Source: Kimley Horn, AECOM (2018), SR37 Transportation and Sea Level Rise Corridor Improvement Plan.

Yet, a clear way forward for the road is not yet in sight. Stakeholders and local communities support the idea of adaptive planning for the corridor. Adaptive planning combines environmental, community, and transportation needs (Shilling, Vandever et al. 2016). However, the infrastructural options that satisfy all of these priorities are expensive, on the order of \$5 billion. Therefore, funding is widely perceived as being the primary obstacle (based on interviews). The four small counties involved are unlikely to be able to raise this amount of money on their own. Furthermore, the road is not a priority for any of the counties. The volume of traffic is small compared to other corridors in the Bay Area, which are higher on the priority list of California highways needing capacity funding and maintenance. Stakeholders have been discussing the option to make SR37 a toll road; this raises equity issues, given the income disparities between the west and east part of the corridor (interviews). Opportunities for public-private partnerships are also being discussed (interviews). Therefore, funding is crucial to the viability of the corridor in the future.

However, there are other significant obstacles beyond funding. Several interviewees perceive the effectiveness of the Policy Committee to be limited. Our interviewees mentioned some of the key hurdles in the collaborative process. One is the different priorities of the four local governments:

Each segment has its own characteristics; for segment B, from Sears Point to Mare Island, the bigger issue is the capacity of the roadway whereas the Marin section which is A1 and the rest of A, that is a sea level rise problem, not a vehicle capacity problem.

That sets things up already as a competition... that is the wrong word... but there are definitely competing needs.

Another hurdle is the lack of clarity concerning who is responsible for the road. The road is a property of Caltrans, but low in its list of priorities for adaptation to sea level rise (interviews). There is no joint management authority of any kind. Although the four counties and their respective transportation authorities want to be thinking proactively and address the vulnerabilities of the road, SR37 is controlled and maintained by Caltrans and thus is no one county's priority or exclusive responsibility. Moreover, adaptive planning is a novel approach to transportation planning; local level public managers are wary of making commitments concerning adaptive options, which are not familiar to them, and uncertain as to whether they have (Shilling, Vandever et al. 2016) the authority to make those decisions. This raises issues also in terms of public accountability:

For the west side there is the suggestion that redoing the levees, which were made to protect farmland, not to engineering standards, would be the most cost effective option, whereas the east side, where there is agricultural land, it may be cost effective to just raise the road. Part of the challenge is that the constituencies... the road is in the middle of marshlands but there is no community around it, only people using it. It's difficult to get people's opinion.

We asked our interviewees to describe the history of the governance process concerning SR37 and how it evolved over time. The corridor was split into three segments around 2013, when a team from the UC Davis Road Ecology Center carried out a comprehensive study⁵ (funded by a grant from Caltrans) of adaptation options for the road. This predates the formation of the SR37 Policy Committee. The picture emerging from interviews was that the coordination process followed an unusual evolutionary pattern, changing from comprehensive and unified to fragmented along traditional administrative boundaries:

Different pieces of the corridor have different issues. When we started meeting [in 2015] we had this vision of lifting all the needs at once. We were going to lift the sea level rise issue along with the road capacity issue, along with the adjacent land use issues, along with resource preservation and enhancement. And then in the fall of 2017 it dawned on us, that, we have got to break this corridor up into little pieces that are more manageable in the traditional project delivery sense of management... so... it just seemed like it was going to be too much to lift everybody at once. (...) But that is risky, also, because, yes we will spend 2 billion dollars raising the road and building this beautiful causeway and then it is still going to close in Marin because we did not do anything about the flooding. But we have kind of taken this position all over the Bay Area, no matter who uses the corridor you are responsible for the piece within your boundaries, and that sometimes is difficult but everybody accepts it.

⁵ State Route 37 Project Website, <https://hwy37.ucdavis.edu/> (last accessed 2 April 2020).

I just think we divided it up because it was so much to manage it as a single corridor that having it in pieces was much more manageable, it's what everybody was more used to.

Therefore, actors involved in the governance of SR37 decided to organize their collaboration around the three segments shown in Figure 3. The Caltrans and the Bay Area Toll Authority (embedded in the Metropolitan Transportation Commission) are involved in the planning for all three segments. In contrast, the Transportation Authority of Marin will only plan for segment A, the Napa Valley Transportation Authority will only plan for segment B, the Solano Transportation Authority is involved in the planning for segments B and C, and the Sonoma County Transportation Authority is involved in the planning for segments A and B.

Currently, segment B segment from Highway 121 to Mare Island is the priority segment and the focus of a Design Alternative Assessment by the Metropolitan Transportation Commission (MTC) because it is where congestion issues on the road are more acute. However, segment A is where flooding issues are most severe, and likely to cause road closure even when congestion is alleviated in segment B.



Figure 3. SR37 corridor split in 3 segments. Source: Sonoma County Transportation Authority website, <https://scta.ca.gov/projects/highway37/>

The explanation for this setback from early aspirations of coordination and a holistic approach to the corridor appears to be lack of precedent. In other words, planning for climate adaptation brings about challenges (primarily, funding and coordination between different jurisdictions and stakeholders) that local governments are not prepared to meet. The differences in their priorities compound the difficulty of the planning process. In an effort to simplify their task, participants in the governance effort eventually decided to split the task into smaller tasks, which each would deal with within their own jurisdiction.

I remember one of the early meetings, where all the transportation agency directors and all the senior technical staff were in a room and we were talking about what to do, how are we going to proceed, this was spring to summer 2017. I remember looking

around the room and thinking: everyone around this room knows how to deliver a project, we are all engineers, planners, leaders, we have done projects, talked to the public, done environmental clearances... but nobody has ever tackled a big sea level rise problem, and I have been thinking that ever since, that what is familiar to these agencies is widening the highway, so that has become the priority.

Nevertheless, several years of collaboration have deepened the ties between the key agencies involved. Interviewees reported satisfaction with how the collaboration for SR37 is structured but recognize that it seemed simpler when only technical staff was involved.

When we started the Policy Committee, there were maybe 12 elected officials and 10 staff. We had open discussions about what to do next. Now that there is [are] 100 people in the audience, honestly a lot of the details are worked out ahead of time, and the meeting itself is a formal reporting on activities and decisions that have been made. (...) There is a structure to that, actually. There is the Project Leadership Team, which comprises technical staff from the transportation agencies, there is an Executive Steering Committee, that is one level up, executive manager level, and then there is the Policy Committee with the elected officials, so three layers of decision making, the final one is the Policy Committee, where all the public are invited to. The Project Leadership Team is where a lot of the nuts and bolts are hammered in beforehand, and those decisions are made and brought to the Executive Steering Committee, and then reported out via the Policy Committee. (...) Like with other public processes, you have to create a technical advisory committee to be able to have those frank discussions between agencies because in a public forum nobody is going to lay their cards on the table because otherwise it's going to be in the paper the next day and you'll never get anything done.

As the visibility of SR37 increased, more and more stakeholders have begun closely following policy developments for the corridor which, as mentioned, crosses a marshland area rich in habitat. In June 2017, in response to the acceleration of plans to redesign and rebuild SR 37, the Sonoma Land Trust convened a group composed of North Bay wetland land managers, ecological restoration practitioners, and other stakeholders interested in the conservation and restoration of the ecologically rich area crossed by SR 37 – the San Pablo Baylands. The group, known as the SR 37–Baylands Group, benefited from a technical assistance grant from the State Coastal Conservancy under the Conservancy's Climate Ready Program, aimed at ensuring that the redesign of SR 37 is compatible with and advances the ecological restoration and conservation goals for the San Pablo Baylands⁶. The Baylands group is actively engaged in the

⁶ State of California Coastal Conservancy, Highway 37 and the San Pablo Baylands, <https://scc.ca.gov/climate-change/climate-change-projects/highway37/> (last accessed 26 April 2020).

collaborative processes surrounding SR37, where it contributes technical expertise and input on analyses of alternative alignments for the corridor⁷.

The environmental value of the area might be key to leverage additional funding and turn SR37 into a multi-benefit project. This is the focus of an SB1 grant awarded to the Bay Area Regional Collaborative (BARC) to explore options that increase public access to the area of SR37 by bicycle, walking, and with access from the road for water recreation. This vision is encapsulated in the Grand Bayway project, which stems from the output of the team focusing on the area crossed by SR37 within the scope of the Resilient by Design challenge. Resilient by Design has been a design competition funded by the Rockefeller Foundation and aimed at supporting innovative climate adaptation design solutions for the San Francisco Bay Area⁸. The Grand Bayway plans to develop bike, pedestrian and water recreation options that balance public access with the protection of sensitive habitat. The project fosters a vision of SR37 as a regional corridor whose re-design for climate adaptation offers opportunities to achieve multiple benefits at once and is therefore able to rely on a broader funding portfolio.

The collaborative process started early on but did not involve all relevant stakeholders from the start. As a result, the process has become lengthier.

The lesson learned is to definitely involve all the stakeholders upfront. You have to go out and find out who has a vested interest and who does not and involve them if they do. We have always focused on transportation and we usually did not engage with environmental stakeholders upfront, traditionally we start engaging with them only later, at EIR stage, we should have engaged with them from the very start... but now we meet with the environmental community and had them help us design the corridor.

Furthermore, the process is perceived as lacking leadership, as agencies at all levels of governance drop responsibility on one another for fixing the corridor. Given its complexity, the project would benefit from the appointment of a project manager (interviews) whose task should be to tie the multiple ends and stakeholders involved together and to sustain engagement in the collaborative process.

There has been discussion of a Joint Powers Authority, but there you need a strong project manager. I have a lot of respect for everyone, but I don't think there is a leader now that is able to drive that agenda, you need someone 100% dedicated to this that is respected in the area. You need a charismatic leader that has the buy-in of the counties.

⁷ Davenport, Jessica (2018), 'Reflections on the SR37 Segment B planning process to date', https://scc.ca.gov/files/2018/06/Reflections-on-the-SR-37-Process-to-Date_02-23-18.pdf (last accessed 26 April 2020).

⁸ Resilient by Design, <http://www.resilientbayarea.org/about> (last accessed 26 April 2020).

Therefore, there is a lack of leadership of the governance process itself, which is perceived as compounding the difficulty posed by the cross-jurisdictional nature of the road.

People do want to collaborate, but when it comes to put something on the ground and you need money to do it, then a lot of those fights occur. If this highway was all within one county, it would probably be a lot easier, but when you have got four counties which are competing, each with their own needs, it complicates everything that much more.

When asked what would improve the prospects of collaboration between the local governments, one interviewee highlighted the importance of making available a stream of funding to be allocated over several years, as opposed to a lump sum going to fix one aspect of the road. A stream of funding would trigger the kind of repeated interaction that fosters coordination in groups (Putnam, Leonardi et al. 1993).

Take for example, for many years there has been meetings of public works; they all get together, and in situations where there was a funding stream and each year there is a certain amount of money, there would be basically agreements that, if jurisdiction A and jurisdiction B had a project each, and wanted to build, but there was not enough money to build both that first year, instead of each getting half the money they needed, which usually means the thing does not get done, the director from jurisdiction B would agree to not apply for the funds that year, so jurisdiction A could get all the grant money and then B would be acknowledged as getting it the following year. But for that to work you have to have assurance that the funding stream is going to be ongoing and that there is sufficient level of trust between the agencies involved, whereas in this case, if there is just a big lump sum that is thrown in all at once, that is when you are going to get people scrambling for whatever they can get.

Despite the prolonged negotiations and persistent uncertainty regarding the future of the corridor, interviewees did not seem to doubt the necessity and viability of the collaboration process. Moreover, all interviewees mentioned that collaboration within the Policy Committee has changed their minds concerning the available options for the corridor and brought them to consider infrastructural solutions they initially deemed unfeasible. Further learning occurred concerning the implications of planning with climate adaptation in mind and the necessity of adjusting one's expectations and opening one's mind to stakeholders' priorities. Interviewees also remarked that the structured collaboration format has been and still is working very well for sharing information between the counties involved.

2.2 San Diego County

The governance environment of the San Diego region is less fragmented than that of the Bay Area and Los Angeles County. The region contains only one county and 18 local governments, compared with the 101 cities and nine counties of the Bay Area and the 191 cities and six counties in the jurisdiction of the Southern California Association of Governments (SCAG). Therefore, the costs of collective action in the San Diego region are probably lower compared to the other two areas under study, given the smaller size of the group (Olson 1965).

The San Diego Association of Governments (SANDAG)—the MPO for San Diego County—plans, builds, and maintains transportation infrastructure in the region. SANDAG manages a steady inflow of money generated through TransNet, a half-cent sales tax destined to transportation improvements which was approved by San Diego County residents in 1987 for 20 years. The tax became operative in 1988 and expired in 2008. However, in November 2004, San Diego County voters approved an extension ordinance and expenditure plan (Proposition A) that extends the TransNet program to 2048. Funds are expected to be generated among highway, transit, and local road projects to reduce traffic congestion in San Diego County.

SANDAG is viewed as the most important forum for collaboration between local governments and transportation actors in the area (interviews). Collaboration between local governments within SANDAG is consolidated by decades of interaction and a structured collaboration system organized in tiers from technical to executive, not unlike the structure of collaboration between local governments for SR37.

2.2.1 The Cardiff Beach Living Shorelines Project

The Cardiff Beach Living Shorelines Project is widely hailed as a successful multi-benefit project, which managed to not only protect transportation infrastructure from current and future flooding, but also increase public access to a popular beach and provide enhanced habitat for plants and animals. These achievements were made possible by a productive coordination process between different entities.

The project concerned the segment of Coast Highway 101 from Restaurant Row to South Cardiff Beach, spanning approximately half a mile of shoreline. This segment has long been vulnerable to ocean surges, which flooded the road frequently. Projections of sea level rise promised to further endanger the road and hamper mobility. The City of Encinitas owns the portion of the Pacific Coast Highway that runs through it and is responsible for its operation and maintenance. The City had been looking for solutions for 14 years (interview)—mostly relying on beach nourishment as a temporary solution—before obtaining a grant that would allow it to turn around the fate of that road segment.

The process started in April 2015, when the Encinitas City Council accepted California State Coastal Conservancy (SCC) Climate Action grant funds to develop a conceptual/feasibility study, with stakeholder participation, on potential alternatives for the road. The Ocean Protection Council (OPC) provided the bulk of the grant funding (\$2,500,000). Other funders include SANDAG and the US Fish and Wildlife Service. The total cost of the project was \$3,000,000.

Key partners in the coordination process included the SCC, who administered the grant; the California Department of Parks & Recreation (landowner); the City of Encinitas (landowner); the San Elijo Lagoon Conservancy, now Nature Collective (who helped develop the project, supplies sand from the lagoon, which is adjacent to the highway, and is in charge of the monitoring); the US Fish and Wildlife Service (who permitted for the biological part); the University of California—Los Angeles (UCLA) and Scripps Institution of Oceanography at the University of

California—San Diego (UCSD); and the Coastal Commission and the US Army Corps of Engineers (for permitting).

The main involved actors established a Memorandum of Understanding that laid out the key aims of the collaboration and a few simple rules concerning sharing information and meetings (interviews). Moreover, the group created several taskforce groups organized in tiers from technical to executive and consultants to move the coordination forward.



Figure 4. Living Shorelines project location in Encinitas, San Diego. Source: Moffatt & Nichol, San Elijo Lagoon Conservancy (2016), Cardiff Beach Living Shoreline Project Final Feasibility Study.

Before obtaining the OPC and SCC grants, the city engineers and program managers were thinking of raising the highway or protecting it by building seawalls and/or rock revetment structures. Eventually, the city Coastal Program manager applied for a Climate Action grant from the Coastal Conservancy. The SCC proposed alternatives to rock revetment ('gray' infrastructure), in accordance with its preference for nature-based adaptation and 'green' infrastructure solutions. These alternatives included the creation of sand dunes covering the rock revetment, making it invisible and maintaining habitat and access to the beach. The dunes project allows beneficially reusing sand from the nearby San Elijo Lagoon annual dredging operations.

Therefore, the Living Shorelines project is indirectly related to the larger San Elijo Lagoon Restoration Project, a large-scale wetland restoration project funded by SANDAG through the half cent local tax Transnet. The export material from the lagoon has been used for the construction of the dune system, as well as beach nourishment at Cardiff State Beach with 300,000 cubic yards of sand. Moreover, the initial aim of the project—to reduce the vulnerability of Highway 101 to flooding—was expanded to include a pedestrian path along the dunes. This made the Cardiff Living Shorelines Project a multi-benefit project. Importantly, the Living Shoreline project includes a monitoring plan. The Nature Collective (formerly San Elijo Lagoon Conservancy) will monitor the affected area every 5 years to explore better ways to maintain the project, as the sand will get washed out by the sea.

On May 22nd, 2019, North San Diego County residents and officials celebrated the opening of the project. The success of the process is credited to successful collaboration and coordination among the entities involved. The interviews for this project focused primarily on this aspect. Interviewees recognized the different missions and priorities that various entities brought to the table. Primarily, there was a clash between the city's 'way of doing things' in engineering terms, which was to provide the most protection using standard engineering techniques, the SCC preference for 'nature-based adaptation' solutions, and the Coastal Commission mandate of preserving access to the beach. Interviewees recognized that these differences promised to make the coordination project contentious:

The main obstacles were the different priorities from the different entities involved. The cross-jurisdictional collaborative project covered two different land ownerships: State Parks on the beach side and the City of Encinitas on the road side. Then the Coastal Commission was permitting the project and was also on the project team, then we had SANDAG involved, our different funding agencies, e.g., OPC, and there were endangered species, so our agency was involved and provided funding. So everyone had different priorities. (...) The city wanted more hard infrastructure, bigger and better. [The] Coastal Commission were constraining the nature side because they wanted to preserve the views and so did not let us have the dunes high enough to protect visual impact. (...) We were intermediaries, we led the negotiations between the City who wanted the revetment and the Coastal Commission who wanted the views. Now we have a very strong monitoring protocol, so that we will see what happens to these dunes. If the dunes erode, the Commission will have to let us build higher dunes. So there has been a lot of focus on adaptive management in that sense.

Two sets of factors averted the collapse of coordination: technology and collaboration. As for the technology, compromise was found with relying on rocks and covering them with dunes and native plants, protecting or restoring habitat. Moreover, the adjacency of the San Elijo Lagoon to the road provided a convenient source of sand that was independently going to be dredged out of the lagoon, but instead of just dumping it onto the beach, stakeholders reasoned that they could make a productive use of it.

As for the collaboration, interviewees emphasized the importance of early stakeholder involvement to achieve compromise on technical and governance solutions for the highway that were unfamiliar to all parties involved. One interviewee commented:

The key [to the success of the project] was to get them [the Coastal Commission and other agencies] involved early and make them part of the team from the start. That helped a ton. We did it, because we knew that we would have to deal with them anyways. That way, we could know what made everybody happy and see what could be done. We involved the Coastal Commission, Natural Resources, etc. very early on. And then it became 'their project,' you know? We had to give up some of our ways of thinking and try something new. But we did it because we wanted to get this road done.

Rather than developing separate plans in isolation from each other and then discussing which would prevail, stakeholders and agencies opted for joint examination of alternatives and collaborative decision-making.

The role of the SCC in the collaborative process was pivotal. The SCC not only administered the grant but worked closely with partners throughout the coordination process. The involvement of all relevant actors in the coordination process from the outset helped foster trust and commitment to the collaboration and served to minimize uncertainty concerning others' mandates and priorities (Johnston, Hicks et al. 2011). In the words of one interviewee:

The SCC was great. They had leverage with the Coastal Commission and used it. They connected us to the right people and to all the partners that we needed to take into account. We started in 2015-2016. Now collaboration is consolidated, we work together great. The coordination was done by Moffatt & Nichol [consultants] who worked with the City and all the agencies.'

Other jurisdictions in the San Diego Area and beyond have approached the SCC to get their support for comparable projects. Highway 1 is vulnerable to sea level rise and surge in various locations. However, it is up to each city to look after their section. It is easy to imagine how coordination between the cities on the San Diego County shoreline would save time and increase the leverage of each community in asking for funds to deal with the whole corridor.

However, the Living Shorelines project is not meant to be a permanent solution but rather an adaptive management strategy that provides critical dune habitat now and protects Coast Highway 1 until increased sea level rise requires different approaches. This type of project enables the city to act now to mitigate flooding, while looking for longer-term strategies to address future sea-level rise.

One challenge was the time scale: the city tends to do planning for at most a 30 year time frame. Therefore, we were not able to develop a project that would be resilient to SLR [sea level rise] in the long term, like we wanted to. In other words, we did not design the project based on the 2050 or 2100 projections, like we wanted. For the longer term, that road will need a different project, such as raising the highway through something like a causeway and doing habitat restoration underneath it. But to do that, the City would need time to update their general plan, do community outreach, do a ton of fund-raising, because that would be a very expensive project, and they would need time to do all that.

When asked about what they think was the secret to successful coordination among so many different entities, all interviewees provided a version of the following reply:

I think [the Living Shorelines project in] Encinitas happened because it stayed completely within the city of Encinitas and State Parks jurisdictions.

In other words, interviewees stated that, had the project been horizontally cross-jurisdictional, different cities may have struggled or failed to coordinate if they had different preferences. At the same time, all the persons interviewed about this project underlined that early involvement of all relevant agencies and stakeholders helped establish the legitimacy of the process and fostered perceptions of fairness, transforming potential tensions into a learning process not only of others' priorities and mandates but also of the benefits of collaboration in practice. The Project Team has transformed into a lean structure of collaboration that will accompany the process throughout implementation and monitoring.

2.2.2 The LOSSAN Railroad

The Los Angeles-San Diego-San Luis Obispo (LOSSAN) railroad is a key transportation corridor for San Diego County. The corridor is 351 miles long and crosses six counties in Southern California: San Diego, Orange, Los Angeles, Ventura, Santa Barbara, and San Luis Obispo. The corridor is overseen by the LOSSAN railroad agency, a Joint Powers Authority created in 1989 and governed by a 11-member board of directors composed of elected officials representing rail owners, operators, and planning agencies along the rail corridor. The LOSSAN railroad connects the San Diego region to the rest of the US. It moves nearly 8 million passengers per year and is the second busiest intercity corridor in the nation. The corridor also provides rail access to the Pacific Fleet, a network of key military bases throughout San Diego County and the Port of San Diego. Finally, LOSSAN provides access to San Diego's 43 miles of beaches and recreational areas.

At Del Mar, the smallest town in San Diego County, the railroad runs on top of bluffs, which have historically been subject to erosion. Sea level rise represents an existential threat to the bluffs and, therefore, the railroad. Recent cliff collapses—particularly the bluff failures occurred

in November 2019⁹—have heightened the urgency of addressing the viability of the corridor, especially given plans to double track it in order to expand traffic.

The tracks were put down in the early 1900s. Initially, the tracks ran more inland. They were moved outward to the bluffs to make room for the expansion of the City of Del Mar. The tracks from the Orange County line to the San Diego City line are owned and maintained by a county transit agency called North County Transit District (NCTD), created by the California State Legislature in 1975 to plan, construct, and operate public transit systems in San Diego County. In 2003, the Legislature transferred the transit planning and capital project responsibilities to SANDAG. Therefore, SANDAG is responsible for the planning, design, and construction of capital projects on the railroad, while NCTD is in charge of maintaining the railroad (projected inundation shown in Figure 5).

⁹ Emerson Smith, J. and G. Robbins (29 November 2019), Train service disrupted following bluff collapses in Del Mar, The San Diego Union Tribune, <https://www.sandiegouniontribune.com/news/public-safety/story/2019-11-29/bluff-collapses-in-del-mar-within-feet-of-train-tracks> (last accessed 26 April 2020).

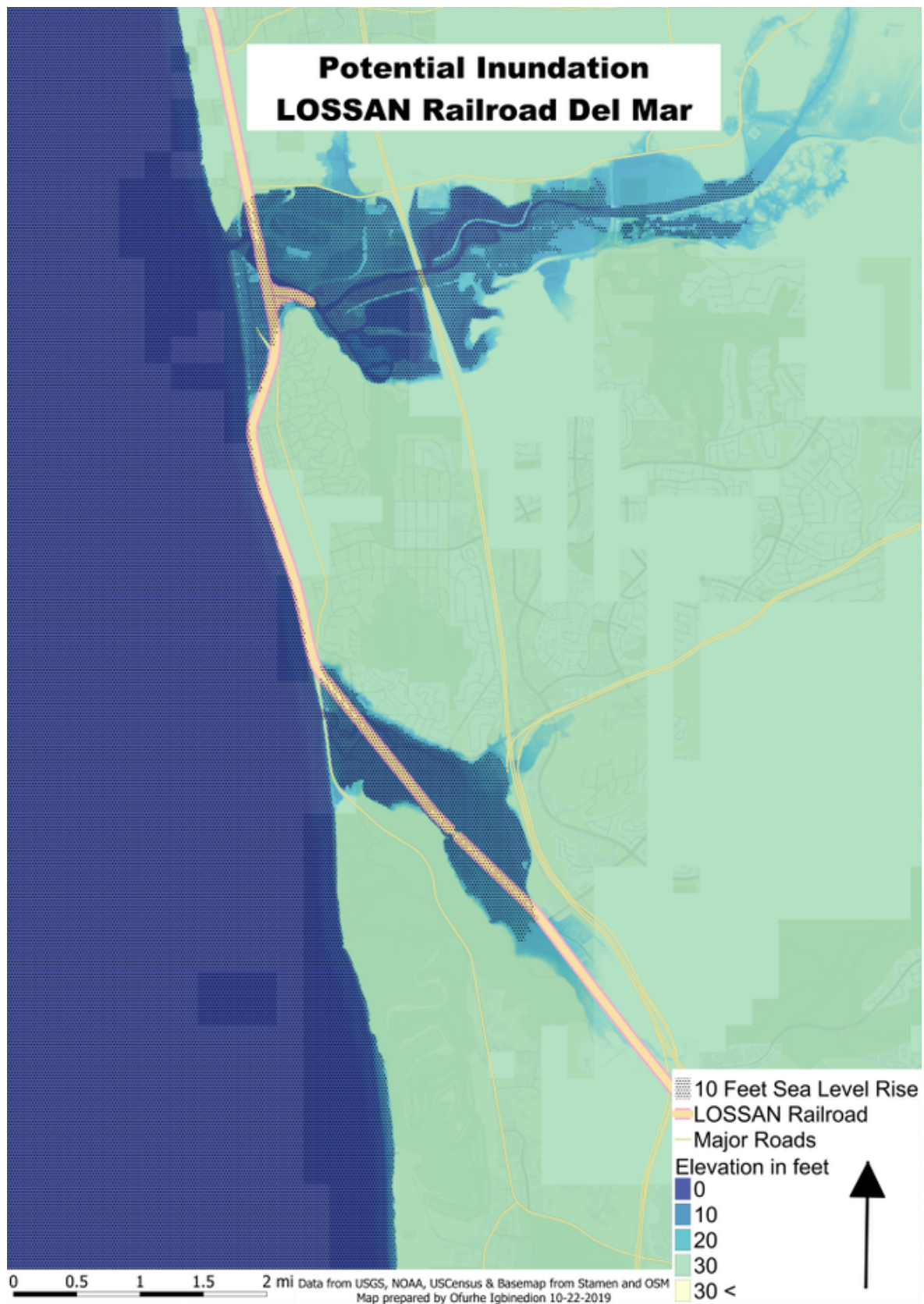


Figure 5. LOSSAN railroad at Del Mar projected flooding at 10ft sea level rise

The crux of the commercial worth of the LOSSAN corridor for San Diego is freight shipping. Of all cars sold in the US, 10% arrive at the Port of San Diego and are then shipped via train to US markets. Freight and goods movement services are operated on the LOSSAN corridor by the Union Pacific Railroad and the Burlington Northern Santa Fe Railway. In terms of freight, Burlington Northern Santa Fe Railway runs more than 30,000 freight cars per year along the corridor, carrying about \$1 billion worth of goods. Were the LOSSAN to fail, all of that traffic would need to be redirected to trucks on the highway, increasing costs for the freighters and the Port, congestion, and emissions. In the extreme, the Port would not be able to accommodate increasing commercial traffic and would see a lot of its revenue vanish, with cascading effects on employment and the economy¹⁰.

The LOSSAN corridor is part of the broader scope of the North Coast Corridor plan that SANDAG made and is financed by a half cent tax approved by voters in 2002, called TransNet. The plan includes infrastructure updates and expansion to accommodate increased traffic both on highways and railroad, as well as environmental improvements (e.g., the San Elijo Lagoon Restoration Project that was crucial to the viability of the Living Shorelines Project by providing sand for the dunes). Providing for the increase in railroad traffic means transforming LOSSAN into a double track railroad. The double-tracking has already been completed on 60% of the tracks. At present, Del Mar—still single tracked—is a bottleneck in the system. Trains have to slow down to pass through it. Therefore, the agencies have to achieve the twin goal of double tracking and protect the railroad from sea level rise.

As mentioned, recent episodes of bluff collapse at the Del Mar Bluffs has heightened the urgency of identifying long-term solutions for the corridor. Near-term improvements will be constructed in early 2020. The project is known as Del Mar Bluffs 4, and it follows stabilization interventions (consisting of concrete and steel columns buried in the ground on the railroad right of way atop the bluff) known as Del Mar Bluffs 1 (drainage) 2, and 3 (stabilization), completed, respectively, in 2003, 2008, and 2011. SANDAG and NCTD are seeking \$100 million to complete the bluff stabilization work (known as Del Mar Bluffs Phases 5 and 6), which will provide for bluff toe protection and slope stabilization to prevent slow retreat.

The planned stabilization efforts will lengthen the life of the assets until 2050 or 2100, depending on how much funding can be made available. In the long-term, the tracks may need to be moved further inland. Planning studies are being conducted; however, design and construction funding has not been identified. Five options are currently being evaluated; all foresee the construction of three tunnels for the trains (one in each direction plus a third for safety in emergency) under the city of Del Mar or further inland, closer to I-5. All options are costed between \$3 and \$5 billion. The permitting process promises to be long, as well as feasibility assessments and assessments of the impact that the tunnels might have on communities living further inland.

¹⁰ Diehl, Phil, 28 July 2019, Del Mar is weak link in San Diego's coastal railroad in the San Diego Union Tribune, <https://www.sandiegouniontribune.com/communities/north-county/story/2019-07-27/del-mar-is-weak-link-in-san-diegos-chain-to-the-north> (last accessed 2 April 2020).

At the time of this research, NCTD was evaluating a less expensive option (\$500 million) developed by an independent consultant that foresaw the creation of trenches along Del Mar bluffs to accommodate the double tracks. This proposition was not welcomed by the city, which is resolutely pushing for relocation of the tracks inland as soon as possible (interviews). The City of Del Mar maintains that the trenches would ruin the bluffs and affect property values, besides limiting residents' and public access to Del Mar beach. Furthermore, in July 2019 the Coastal Commission sent a letter to SANDAG stating that the bluff trench alternative would be in direct conflict with many Coastal Act policies, by limiting public access and beach resources. The Commission encouraged SANDAG to focus on the tunnel options instead¹¹. Therefore, it is unclear whether the trench option will be pursued in the future.

Although we were able to identify the key actors involved in the corridor (SANDAG, NCTD, the Port of San Diego, the City of Del Mar, the freight companies, Amtrak, the Coastal Commission), at the time of the fieldwork carried out for this research in San Diego (May to September 2019) we could not discern the existence of a collaborative process between all of them. While SANDAG and NCTD collaborate closely and regularly report to the City and other involved stakeholders, there appeared to be no collaborative framework to jointly address the vulnerabilities of the railroad. Given the strong interdependence between its operations and the viability of the railroad, the Port of San Diego also has an interest in maintaining the tracks and is involved in discussions with NCTD and SANDAG (interviews). We were warned that it would prove difficult to reach out to the freight companies; indeed, we were not successful. Freight companies pay NCTD a fee to use their tracks, because NCTD has right-of-way. The NCTD is contractually bound to maintain the tracks to be able to provide shipping service. None of the interviewees mentioned the prospect that the freight companies contribute to the improvement of the tracks.

Moreover, we could not identify the presence of any actor or organization that acted as facilitator or intermediary between the different agencies and stakeholders, in a way comparable to the Coastal Conservancy in the Encinitas case. Although NCTD, SANDAG, and Del Mar are in constant dialogue about the tracks, we could not identify a dedicated policy forum for the corridor, similar to the Policy Committee for SR37 in the Bay Area.

Importantly, the interests of the actors involved are not well aligned. Whereas the transportation agencies and the Port have common interests in ensuring the viability of the railroad, the City of Del Mar is more interested in preserving beach access and property values. Moreover, the City of Del Mar has little decision-making power concerning the tracks. The City has a clear preference for the relocation of the tracks inland and seeks to use the means at its disposal (e.g., carrying out their own study for adaptation) to influence decision-makers in that direction (interviews). Furthermore, the City has land use authority, which it can leverage towards decision-makers (interviews).

¹¹ Diehl, Phil, 19 August 2019, Coastal Commission frowns on trenching idea for rail tracks atop oceanfront bluffs, Los Angeles Times, <https://www.latimes.com/california/story/2019-08-19/coastal-commission-frowns-on-trenching-idea-for-rail-tracks-atop-oceanfront-bluffs> (last accessed 2 April 2020).

The emergency repairs that followed the bluff collapse in November 2019, however, heightened the political visibility of the corridor. The California Secretary of Transportation established—at the request of Christine Kehoe, the San Diego representative on the California Transportation Commission—the LOSSAN San Diego Regional Rail Corridor Working Group, which convened for the first time on January 19, 2020 at SANDAG headquarters. The Working Group, which will convene on a quarterly basis, brings together local, regional, and state leaders, including—e.g., the California State Transportation Agency¹² and the Coastal Commission—to discuss long-term bluff stabilization and rail re-alignment strategies¹³.

2.3 Los Angeles County

Los Angeles and San Diego County are less exposed to sea level rise than the Bay Area (Aerts, Barnard et al. 2018, Kalansky and Cayan 2019). Therefore, transportation is not considered among the worst affected sectors in the area (Aerts, Barnard et al. 2018). The primary concern for policy-makers and public managers in the area, when thinking about sea level rise, is beaches and marinas. The most affected areas in the city will be Marina del Rey and Venice. The LA City Planning department is planning for those areas, investing a lot of effort on public outreach (interview).

The key transportation assets that are vulnerable and will be affected by sea level rise are the Port of Los Angeles and the Port of Long Beach.

The main finding that stands out from fieldwork in the LA area is the lack of coordination between different agencies and stakeholders. Even those agencies that have developed vulnerability assessments and climate adaptation plans ahead of schedule (e.g., LA Metro and Port of Long Beach) at the time of this research they had not yet engaged into collaboration with other actors with regard to adaptation to sea level rise.

2.3.1 The Port of Long Beach

Like other Ports in the state, the Port of Long Beach is a trustee of the State of California of the land it occupies. This means that the Port was granted sovereign public trust land (i.e., land that California acquired upon statehood in 1850) to manage in trust for the people of California. In 2013, the State Legislature passed Assembly Bill (AB) 691, which requires local trustees of public trust lands whose gross public revenues average over \$250,000 between January 1, 2009 and January 1, 2014 to prepare and submit to the State Lands Commission by July 1, 2019 an assessment of how the local trustee proposes to address projected sea level rise.

The Port of Long Beach was the first in the state to complete and submit the required AB691 report to the State Lands Commission (interviews). This is potentially due to the sensitivity of

¹² Emerson-Smith, Joshua, 28 January 2020, SANDAG kicks off largest effort to stabilize Del Mar bluffs, protect rail line in nearly a decade, The San Diego Union Tribune, <https://www.sandiegouniontribune.com/news/transportation/story/2020-01-27/sandag-stabilize-del-mar-bluffs-lossan-rail-corridor> (last accessed 2 April 2020).

¹³ California Coastal Commission, Executive Director Report February 2020, <https://documents.coastal.ca.gov/reports/2020/2/W6a/W6a-2-2020-report.pdf> (accessed 2 April 2020).

the Port management to the threats posed by climate change, after the Port experienced considerable damage due to Hurricane Marie in August 2014 (workshop discussion). The hurricane created a storm surge which greatly damaged the breakwater (owned by the US Army Corps of Engineers) protecting massive cargo ships and sensitive equipment surrounding the port, as well as one of the port's piers. As a result, shipping operations were completely halted at two port terminals¹⁴.

The very comprehensive report looked at only the footprint of the Port itself, identifying several key vulnerabilities and providing, as per the AB691 requirements, maps showing the areas affected, estimates of financial costs of the impact of sea level rise on granted public trust lands, and a description of how the local trustee proposes to protect and preserve natural and manmade resources and facilities located, or proposed to be located, on trust lands and operated in connection with the use of the trust lands. The bill also states that *"In addressing the impacts of sea level rise, a local trustee shall collaborate with its lessees, appropriate local, state, and federal agencies, and other users of the granted public trust lands."* (Section 6311.5(e))¹⁵. However, the law does not mandate any specific adaptation action.

Although their report considered only the footprint of the Port itself, the Port of Long Beach is keenly aware of its interdependencies with railway and highway, as well as of the permitting agencies it will have to coordinate with to address sea level rise. At the time of this research (May 2019) no coordination had actually started. More recently, however, the Port has started informal dialogue with the City of Long Beach, the City of Los Angeles and the neighboring Port of Los Angeles (workshop discussion).

Together with the City of Long Beach, the Port of Los Angeles, and the City of Los Angeles, the Port of Long Beach is part of a Joint Powers Authority for the Alameda Corridor Transportation Authority (ACTA) which is a 20 mile trench that connects the two Ports and is vital to their operations, since around 30% of all cargos travel on that corridor. There is a project to enhance the rail system on Terminal Island. It is mainly to improve efficiency, but sea level rise is also taken into account. The Port (the grey area in Figure 5) will be opting for a conservative design to build it at a height that prevents any flooding (interview). For that, the Port will need to talk to the railways, Burlington Northern Santa Fe Railway and Union Pacific Railway, and the Coastal Commission (interviews). At the time of this research, no such dialogue had begun.

¹⁴ Ruiz, J. (22 April 2019), The impact of climate change on Long Beach port will be profound, <https://lbpost.com/climate-change/climate-change-port-of-long-beach/> (last accessed 26 April 2020).

¹⁵ Text of the Assembly Bill 691 https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB691 (last accessed 2 April 2020)

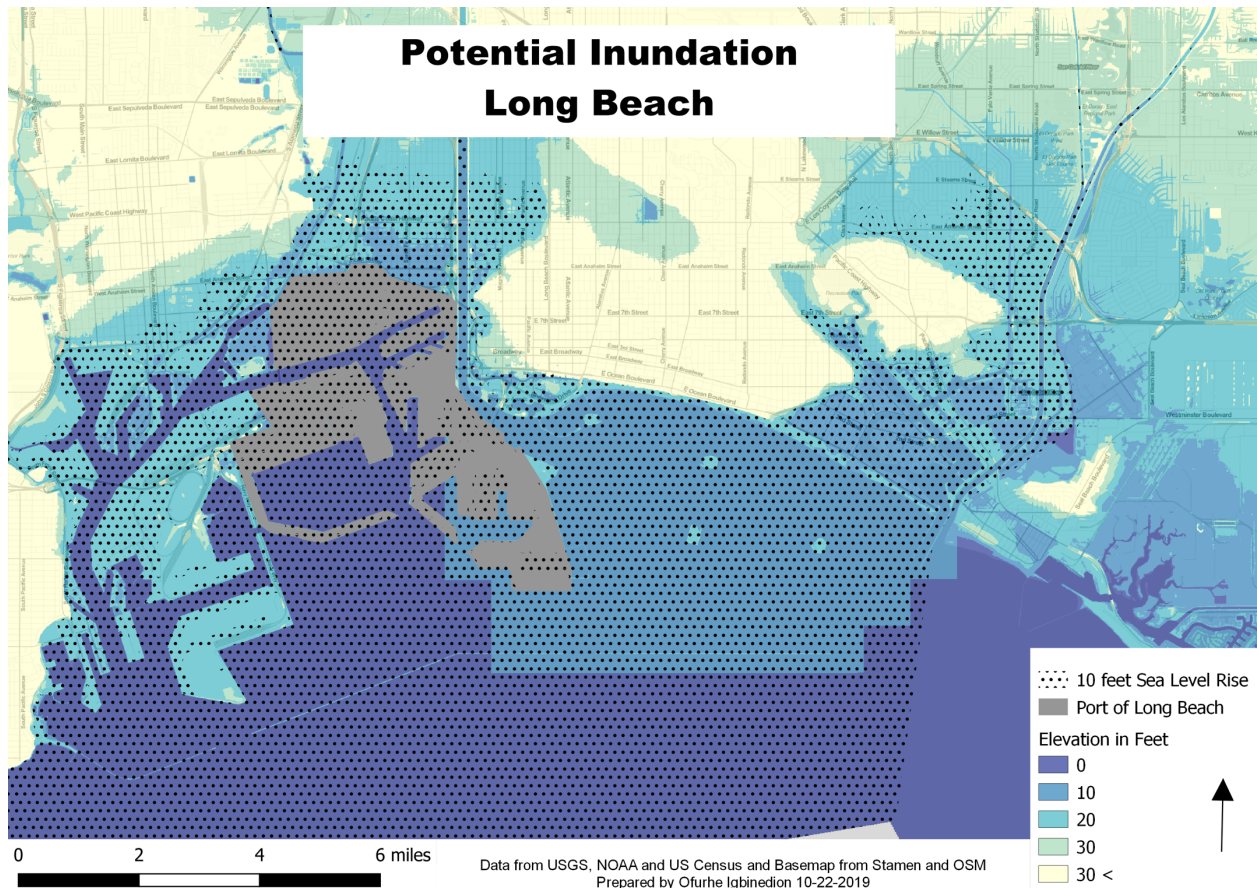


Figure 6. Port of Long Beach flooding at 10ft sea level rise

One of the Port's main concerns regarding flooding is the Dominguez Channel. The channel drains stormwater into the Port of LA. Future potential overtopping at the point where the channel enters the Port, coupled with storm surge, could inundate Port of Long Beach's property. The Port envisages coordination to be necessary to deal with the risk posed by the Dominguez Channel. The agencies involved in that regard would be the US Army Corps of Engineers, the US Coast Guard, the Los Angeles County Flood Control District, the Coastal Commission, the Port of Los Angeles. The Port has three segments of breakwater riprap, so that will be discussed with the USACE when it comes to breakwater (interviews). Moreover, the Port did a risk and vulnerability assessment that includes transportation infrastructure (e.g., 710 freeway, 47 freeway, and the railway), but has not yet started any projects.

The Port is completing a feasibility study for the enhancement of an existing seawall at the Pier S shoreline to protect oil and chemical storage infrastructure, a fire station, and other transportation and backland assets. In that regard, they will work with the USACE and the State Lands Commission. The State Lands Commission has already approved their adaptation plan, but the Port intends to keep them informed of their progress informally, to make sure they understand what the Port will be doing (interview).

Given its relatively lower exposure to sea level rise, the Port Environmental Team finds it difficult, at the moment, to prioritize work on sea level rise, because the Engineering Team has already many projects in their queue (interview). However, the Port is clearly aware of the necessity of interaction with stakeholders and other entities that it has interdependencies with. On the one hand, the Port plans to leverage existing working relationships with other agencies; on the other, it realizes that it may have to branch out to new stakeholders and collaborate with existing ones in different ways.

3 Lessons Learned

Regional and state governance for sea level rise would benefit from a visioning plan devised by a multiplicity of key agencies and stakeholders from all levels of governance (Lubell 2017), able to provide a coherent and comprehensive policy direction. Meanwhile, public managers involved in governance processes at local levels focus on solving practical issues of coordination. These can be grouped under three main headings (see Table 3): fostering collaboration across agencies that are unused to work together, bridging jurisdictional boundaries, and tackling funding constraints.

Collaborative governance is particularly beneficial when public managers design a policy or program that extends beyond their core competencies—for instance, designing and planning nature-based adaptation infrastructural solutions, as in the Living Shoreline case—because it allows them to benefit from the expertise of subject area experts (Scott and Thomas 2017). Moreover, collaborative approaches are useful when public managers are unable to take unilateral actions that match the geographic scale of a policy problem; for instance, when the given infrastructure corridors cross jurisdictions, as in the SR37 case. This is the rationale for horizontal collaboration across jurisdictions.

When public managers at a federal or state level design a policy or program that requires local actions, public managers benefit from using collaborative governance tools to jointly implement programs, plans, or projects with local or regional governments. This explains the involvement of Caltrans and/or regional MPOs and other key agencies (e.g., the Coastal Commission and the Coastal Conservancy) in the cases considered. These actors have mandates that, in climate adaptation issues, can only be adequately fulfilled in collaboration with local level decision-makers. In turn, public managers at a local or regional level often require additional capacity or resources to address sea level rise. These managers benefit from using collaborative governance tools to jointly implement programs, plans, or projects with state or federal agencies (Scott and Thomas 2017), who can contribute resources, expertise, and working relationships with other involved agencies. This is the rationale for collaboration across levels of governance.

For these collaborative relationships to foster learning between participants and increase chances of achieving consensus, they must strive to foster perceptions of fairness, inclusion, and trust among their participants (Leach, Weible et al. 2013). Equally important is the presence of leaders or facilitators who can jump-start the learning process by bringing together diverse interests and ensure that new ideas are fostered, error is tolerated, and information is shared openly (Gerlak and Heikkila 2011). The cases studied in this research provide practical examples of the ways in which collaborative governance helped actors achieve these goals or made them realize that these are the goals they should strive for. This section contains the table of lessons learned (Table 3 [same as Table 1 in Executive Summary]).

Table 3. Key findings from this research

Governance challenges	Lessons learned from the case studies	Issues to bear in mind when deriving lessons from other jurisdictions
1. Stakeholder involvement or “collaboration with ‘unusual’ partners”	<ol style="list-style-type: none"> 1. Include a whole range of relevant agencies and stakeholders into the governance process early on; 2. Identify an intermediary and/or facilitator who has knowledge of the relevant actors and pre-existing social capital with them; 3. Establish a coordination forum where negotiations and exchange of information can occur; 4. Collectively draft a memorandum of understanding to lay down the rules of collaboration. 	<p>Capacity: resources and staff available to transportation agencies;</p> <p>Number of actors involved from each level of governance;</p> <p>Presence of pre-existing positive collaborative relationships between the actors involved;</p> <p>Exposure of transportation assets to sea level rise;</p> <p>Existing vulnerabilities of the corridor/asset;</p> <p>Economic relevance of the corridor / asset.</p>
2. Jurisdictional fragmentation	<ol style="list-style-type: none"> 1. Establish a coordination forum where negotiations and the exchange of information can occur; 2. Identify an intermediary and/or facilitator who has knowledge of the relevant actors and pre-existing social capital with them; 3. Appoint a project manager to tie all the project parts and stakeholders together and sustain engagement; 4. Structure the collaboration in tiers from technical/operational to executive/political so that issues can be dealt with at the appropriate level. 	

Governance challenges	Lessons learned from the case studies	Issues to bear in mind when deriving lessons from other jurisdictions
3. Lack of funding	<ol style="list-style-type: none"> 1. Explore options to make the project a multi-benefit project; 2. Advocated for a multi-year stream of funding rather than a lump sum; 3. Leverage collaboration for funding: evidence of collaboration suggests to funding bodies they are making an efficient investment. 	

3.1 Early Engagement

The main lesson learned across all cases is that identifying and involving all the relevant agencies and stakeholders in the collaborative process early on is crucial to its success. It is important that those who take the initiative invite relevant stakeholders to join the collaboration early; this enhances the legitimacy of the process and fosters authentic collaboration. This conclusion derives not only from the academic literature (Leach, Weible et al. 2013) but also from the practical experience of public managers and stakeholders involved in the Living Shorelines project at Encinitas (San Diego) (interviews). By ‘relevant agencies and stakeholders,’ we mean not only those whose approval is necessary for the project to move forward, but also those who are going to be affected by each proposed solution.

From the very start, the collaborative process must be explicitly aimed at understanding stakeholders’ priorities and mandates. In contrast, engaging relevant stakeholders late in the process and presenting them with plans of action that they made no contribution to has the effect of delaying the achievement of consensus. Therefore, it should be avoided. This is one of the main lessons learned from the case of SR37: several interviewees indicated that not engaging with environmental organizations earlier in the collaborative process has had the effect of delaying the achievement of consensus.

Furthermore, the Living Shorelines case confirms that the collaborative process can be greatly helped by the presence of a facilitator or intermediary who has a history of collaboration with some of the involved organizations (Gerlak and Heikkila 2011). An effective facilitator fosters early engagement of relevant stakeholders and helps structure the collaboration process and set clear expectations among participants.

Projects with high political and economic salience stand to especially benefit from not only facilitation but also effective political leadership. The governance process concerning the

LOSSAN railroad corridor is a case in point. Despite stabilization efforts having been ongoing since the late 1990s, the collaborative process only just started thanks to the intervention of a local politician, Christine Kehoe of the California Transportation Commission. Following recent bluff failures in the area, she prompted the creation of a LOSSAN Working Group where relevant actors coalesce in a collaborative process aimed specifically at obtaining funding for long-term solutions for the railroad.

3.2 Jurisdictional Fragmentation

All of the regions under study have had or will have to tackle the challenge of jurisdictional fragmentation, whatever their size. However, SR37 is our only case study where the corridor spans different local jurisdictions, who are all involved in the collaborative process.

Findings from the interviews for the SR37 case showed that public managers have benefited from structuring collaboration between local governments in levels, ranging from technical/operational to executive. This structured collaboration process appears widely adopted and effective when involving homogenous actors, i.e., all local governments departments/agencies. SANDAG uses a similar system for its internal deliberations (interviews). When actors are heterogeneous (i.e., belong to different levels of governance and/or have different mandates), as in the Encinitas case, the collaboration seems to be commonly structured via a memorandum of understanding. As a matter of fact, the SR37 process includes both structures: the structured collaboration among local governments and an MoU including state and regional agencies; given the co-presence of horizontal and vertical cross-jurisdictional issues, this appears appropriate.

Interviews concerning the SR37 case reveal the widespread perception that the process lacks leaders with the ability to catalyze stakeholders around a common vision. Rather, individual actors, from all levels of governance, are perceived as having attempted to shift responsibility for dealing with the problems of the corridor to one another, rather than coalescing in a concerted approach.

However, after several years of regular collaboration and the involvement of a broad spectrum of stakeholders, these initial hurdles appear to have been overcome. The conditions for the 'reflexive learning' (Dunlop and Radaelli 2018) are, therefore, met. This does not imply that the decision-making process will speed up, however. Transportation planning commonly takes place over long time frames (Shilling, Vandever et al. 2016) and in this case is complicated by the presence of stakeholders who are unfamiliar with the workings of transportation agencies. Reconciling these differences will be an important task awaiting the leaders of the collaborative process.

The SR37 and the Living Shoreline cases suggest that establishing a coordination forum where frank and open discussions can occur (e.g., the Project Team in the case of Encinitas and the SR37 Policy Committee) is beneficial to create trust among participants and to clarify goals and priorities through regularly scheduled meetings and the transparent sharing of information.

Moreover, coordination and a concerted approach are necessary to address the third big governance challenge: obtaining funding from higher levels of governance.

3.3 Lack of Funding

The research showed that funding is a key hurdle in addressing adaptation: the costs of adaptation in transportation, particularly for the long-term, are very high and it is, as yet, unclear how to raise the necessary funds. Governance issues are not separate from funding issues. One interviewee mentioned, drawing on their own experience, that collaboration and bargaining between different actors who all need funding for their individual projects is facilitated by a continuous stream of funding over a long period of time, rather than a lump sum. The opportunity to coordinate over time facilitates the task of setting priorities, if actors can be sure that their turn to benefit from the funding will come. These types of mechanisms help overcome collective action problems (Putnam, Leonardi et al. 1993) by creating intertemporal interdependencies between involved actors. In contrast, 'lump sum' funding encourages competition and conflict.

Besides long-term funding issues, local and regional actors face resource constraints in terms of fostering and supporting collaborative processes. Pre-existing positive collaborative relationships among at least some of the actors involved may ease the collaborative process, particularly if one of the actors is willing and capable to act as intermediary between those actors who have never collaborated before (or not in a comparable capacity). The Living Shorelines case shows that projects that can achieve multiple benefits at once also have access to a wider range of funding options.

3.4 Issues to Bear in Mind When Learning from Other Jurisdictions

Policy lessons learned in one geographic and political context can potentially be applied to other contexts, bearing in mind ecological, economic and institutional differences. The most important differences are evident among the cases in this study. These are:

1. **Capacity:** Across the three areas, local governments, transportation agencies and MPOs have very different mandates and resources; they also differ in their funding sources (SANDAG manages the revenue generated from the local tax TransNet, which has been in place for over 20 years; the Metropolitan Transportation Commission collects bridges tolls; SCAG only administers state and federal funding) and staff availability (SANDAG has over 300 employees, MTC has over 200, SCAG has 134);
2. **Number of stakeholders involved:** The San Diego region has fewer relevant actors than does the Bay Area or Los Angeles region; likewise, the number of relevant stakeholders in a collaborative governance process can range from a handful to many; higher group size can render the coordination task more difficult as transaction costs and difficulty in monitoring the group effort's increase (Olson 1965);
3. **Exposure & Interdependencies:** Of the three regions studied, the Bay Area is most exposed and has the most infrastructure located at sea level; dealing with sea level rise in transportation is perceived to be more urgent in the Bay Area than in Southern

California (Aerts, Barnard et al. 2018, Kalansky and Cayan 2019); this might explain why collaboration is generally more advanced in the Bay Area than in Southern California;

4. **Presence of pre-existing positive collaborative relationships between the actors involved:** the ability to leverage existing working relationships might ease the collaborative process, by simplifying the task of nurturing familiarity and trust if trusted actors can vouch for others; in the Living Shorelines case, the SCC acted as a facilitator and managed to bridge the relationship between the City and the Coastal Commission;
5. **Existing vulnerabilities of the corridor/asset:** in three of the four cases we examined, the vulnerabilities of the transportation corridor were well-known and pre-date the threat of sea level rise; sea level rise provided reason for renewed urgency to address these vulnerabilities and opened new funding opportunities;
6. **Economic relevance of the corridor / asset:** numerous interviewees remarked that the primarily local importance of SR37 is an obstacle to leveraging the considerable funding needed to protect the road in the longer term.

4 SB1 Recipients in the Three Regions

As mentioned in the introduction, this project results from a research grant awarded to us by the Institute for Transportation Studies at UC Davis, financed under Senate Bill 1 (SB1), the Road Repair and Accountability Act of 2017. In an effort to maximize the impact of the grant and to study the applicability of our lessons learned to collaborative processes that have just started, we reached out to local and regional actors who were awarded SB1 funding in 2018 in each of the three regions. We aimed to investigate what they expect their key governance challenges to be in the future. We selected four transportation projects, all of which focus on cross-jurisdictional collaboration:

- 1) The Marin County Highway 1 corridor Project (Bay Area);
- 2) The County of San Mateo Climate Vulnerability and Resilience Planning Project (Bay Area);
- 3) The SANDAG Regional Transportation Infrastructure Sea Level Rise Assessment and Adaptation Guidance;
- 4) Southern California Regional Climate Adaptation Framework developed by SCAG.

The findings from these interviews confirm the importance of the governance challenges we identified: cross-jurisdictional collaboration is mentioned in all cases as the main challenge, together with lack of funding. Actors in the Bay Area and in the San Diego region plan to leverage established collaborative relationships between local governments and stakeholders to maximize the effectiveness of their grant. In San Diego and the Los Angeles region, a core aim of the MPOs is collating and sharing available funding sources for the local governments in their region.

4.1 Marin County & San Mateo County

Marin County obtained SB1 funding for two projects: one involves formulating an action plan for the portion of SR37 in the county, i.e., from Highway 101 to the Petaluma River, to address sea level rise¹⁶; the other aims at increasing Marin County's resilience to the impacts of climate change, specifically in the area spanning the intersection of State Highways 101 and 1 north to Mill Valley (Manzanita area). We focused our interviews on the latter project, whose goals include to 'Utilize track record of successful partnerships and public engagement strategies to advance short-, medium-, and long-term sea level rise planning.'¹⁷ At the time of this research, the project was only just beginning and no meetings had taken place as yet.

¹⁶ ResilientCA, Highway 37 corridor - SB1 Adaptation Planning Grant: Initial Case Study - Challenge: Developing plans and strategies, <https://resilientca.org/case-studies/highway-37-corridor-climate-adaptation/> (last accessed 2 April 2020)

¹⁷ ResilientCA, Highway 1 corridor in TAM valley - SB1 Adaptation Planning Grant: Initial Case Study - Challenge: Developing plans and strategies, <https://resilientca.org/case-studies/Highway-1-Corridor-in-Tam-Valley-Transportation/>, (last accessed 2 April 2020)

The San Mateo County project¹⁸ is aimed at assessing the vulnerability of transportation corridors in the county to several impacts of climate change, including sea level rise but also heat and wildfire. At the time of this research, there had been a transportation-focused stakeholder meeting focused on the impacts of wildfire. More generally, the idea of the project is that the County would work with consultants to model scenarios for up to two locations for each impact. At the time of this research, the stakeholders group (which included the 20 cities of the county, the county itself, the county transit district SamTrans, and commuter rail service providers such as CalTrain and the Bay Area Rapid Transit) had not yet identified locations for flooding scenarios. When asked the criteria use to select corridors, our interviewee mentioned that developing those criteria is a crucial part of the process, as it involves defining which corridors have the highest value.

Representatives from Marin County and San Mateo County took part in the policy workshop held on April 23, 2020 and outlined their respective projects. We provide a summary of the main updates in the workshop summary in Section 5.

4.2 SANDAG

The San Diego Association of Governments (SANDAG) has received SB1 funding to develop a Regional Transportation Infrastructure Sea Level Rise Assessment and Adaptation Guidance¹⁹. The project will focus on transportation infrastructure that is threatened by sea level rise and crosses jurisdictional boundaries. The goals of the project are assessing vulnerabilities and, crucially, documenting the lessons learned from local jurisdictions who are already conducting sea level rise vulnerability assessments and preparing Local Coastal Program Amendments to include adaptation policies. As a result, SANDAG will develop an adaptation “toolkit” comprising local and regional measures and funding sources to mitigate sea-level rise impacts that all jurisdictions in the region can refer to. In so doing, SANDAG proposes to build on existing local efforts and therefore achieve two related goals: 1) provide local jurisdictions with information concerning what other jurisdictions are doing; 2) leverage the efforts of jurisdictions at the forefront of adaptation (i.e., ‘leaders’) to set the pace for broader adoption of adaptation measures by jurisdictions who lag behind. The Project Team implementing the project consists of SANDAG officials, consultants, local jurisdictions, and Caltrans.

SANDAG supports local efforts to draft Climate Action Plans. Crucially, it has made the possession of a plan a requirement for parties applying for grants from SANDAG. The importance of this power, held by SANDAG, can hardly be overstated. The possibility to render access to funds conditional on policy development at local level allows SANDAG to be more effective at achieving the goal of any and all public policy: changing behavior to achieve socially

¹⁸ ResilientCA, County of San Mateo Climate Vulnerability and Resilience Planning Project, SB1 Adaptation Planning Grant: Initial Case Study - Challenge: Working across jurisdictional boundaries, <https://resilientca.org/case-studies/county-of-san-mateo-climate-vulnerability/> (last accessed 2 April 2020)

¹⁹ ResilientCA, SANDAG Regional Transportation Infrastructure Sea Level Rise Assessment and Adaptation Guidance - SB1 Adaptation Planning Grant: Initial Case Study - Challenge: Developing plans and strategies <https://resilientca.org/case-studies/sandag-regional-sea-level-rise-adaptation/> (last accessed 2 April 2020).

desirable goal. Developing a Climate Adaptation Plan renders local jurisdictions more competitive applicants for grants at both regional and state levels. Climate Action Plans, however, are focused on greenhouse gas mitigation, rather than adaptation. SANDAG should evaluate whether to introduce requirements for CAPs to be updated in light of the necessity of climate adaptation.

Instead of creating a separate platform for discussion and collaboration over sea level rise with local governments, SANDAG has chosen to incorporate those discussions into the framework of an existing working group—the Shoreline Preservation Working Group—which has been meeting since the 1980s to address beach nourishment issues in the region. SANDAG considered that there was a natural nexus between erosion and sea level rise and that therefore the latter could be initially framed into the former. Importantly, this means that SANDAG embedded sea level rise into a pre-existing framework of collaboration: local policy-makers have dealt with beach nourishment in the past and are used to cooperating about it. This strategy might prove effective in catalyzing local governments attention on the issue by mainstreaming sea level rise into the existing and well-established collaboration procedures internal to SANDAG.

SANDAG's ability to enact measures fostering policy development at local level, combined with the embedding of sea level rise into an existing and consolidated work group, appear as potentially very effective strategies to foster adaptation to sea level rise in the transportation sector in the region. The findings from our research will be relevant for later stages in this process, as priority projects are identified. Our findings suggest that creating a dedicated forum for collaboration is effective when projects need to involve agencies and stakeholders from other levels of governance. Moreover, structuring collaboration in some fashion (typically, an MoU) helps stakeholders collectively set goals and expectations.

4.3 SCAG

The Southern California Association of Government (SCAG) has received SB1 funding to develop a Regional Climate Adaptation Framework²⁰ for the use of the six counties and 191 cities in its area of jurisdiction. SCAG plans to develop resources and implementation tools for adaptation in transportation and to provide those to local jurisdictions and stakeholders. The project aims to integrate existing resources and sources of information from different agencies and levels of governance and to offer them as a toolkit for adaptation to local jurisdictions. The Project Team comprises SCAG, a consulting group, and local governments. The project foresees using focus groups and surveys with local jurisdictions to gather information concerning their current efforts to integrate adaptation into their planning processes for transportation. This data collection will result in a collection of best practices or lessons learned, to be disseminated broadly, eventually consisting of an adaptation toolkit that local jurisdictions can refer to as

²⁰ ResilientCA, Southern California Regional Climate Adaptation Framework, SB1 Adaptation Planning Grant: Initial Case Study - Challenge: Working across jurisdictional boundaries, <https://resilientca.org/case-studies/southern-california-regional-climate-adaptation/> (last accessed 2 April 2020)

they further their planning. Public outreach is the other key component of the project and comprises numerous public outreach events and webinars.

Therefore, the aims of the SCAG's projects are strikingly similar to those of SANDAG's. However, the underlying features of the governance system in the SCAG region suggest that the two projects will differ in their implementation and, plausibly, their outcomes.

The LA area has traditionally strong city and county governments, which compete for revenues and resources. In other words, there is an age-old resistance to regional governance in the area (Lewis and Sprague 1997). SCAG is a planning agency, with no construction powers. It does not own any infrastructure assets. It has no power to compel behavior. It relies exclusively on political consensus for adoption of projects. SCAG reacts to the requests and priorities of the local jurisdictions and is rarely proactive (interviews).

Local jurisdictions in the SCAG regions are currently not as concerned about the impacts of sea level rise on transportation as they are on the impact of rising seas on beaches and, therefore, recreational access and tourism (interview). Yet, the impacts of sea level rise will be felt several miles inland. Orange County is projected to be particularly affected, as well as the Pacific Coast Highway at Malibu and several other spots in the region (Hall, Berg et al. 2019).

Eventually, somebody will be given authority to deal with this, probably at state level... the state will intervene, with legislation and perhaps empower an agency, like Caltrans, to deal with this. But here the conversation has not really started yet, primarily because there is no funding really to make it happen.

Against this governance background, the goal of SCAG with the Climate Adaptation Framework is to provide local jurisdictions with high-quality information. More generally, a reputation for expertise, coupled with the traditional role of MPOs in channeling state and federal funding to local governments, are the tools that SCAG relies upon in order to persuade or nudge local jurisdictions towards specific policy goals (interviews).

We mainly react to what the cities want. They come to us because we are the planners, we have the expertise and especially we have the money to get that expertise from outside if we do not have it in-house. That is why the cities come to us. We channel state and federal funds. (...) But there is no BCDC [the Bay Conservation and Development Commission, in the Bay Area] here, no Joint Policy Committee, I mean, no state initiative that mandated collaboration between the four regional agencies and said 'you must work together.' We are much more decentralized. (...) We will do this with the adaptation study. We will bring the issue to the cities. We will tell them that it is a big deal, but they do not have to do anything with this information. Then the first 10 cities will adopt a plan. Then we will do more outreach, and another 10 cities will adopt a plan. There are always those who are leaders, and those who come around later.'

The juxtaposition of the SANDAG and SCAG plans for developing regional adaptation frameworks for sea level rise is a powerful reminder of the importance of the institutional context of a region, whose agencies set out to address a complex policy issue, such as sea level

rise. SCAG has less capacity and faces more jurisdictional fragmentation than actors in the other two regions considered. The findings from this research suggest that cross-jurisdictional collaboration benefits from facilitation, structure, but also proactive leadership. While SCAG appears well-positioned to provide information and facilitate discussion, leadership may pose a bigger challenge given its traditionally reactive role.

5 Workshop Summary

As part of the deliverables of this project, we organized a workshop for public managers to meet and discuss the challenges they face in their collaborative processes and the lessons they have learned so far in their respective contexts. The workshop was scheduled for April 23, 2020 at the Institute of Transportation Studies (ITS) at UC Davis. However, due to the shelter-in-place and social distancing rules related to COVID-19, we shifted the workshop to an online format. The workshop took place on April 23, 2020 between 9:00 am and 13:00 pm PST on the videoconference platform Zoom. ITS staff organized the event in collaboration with the authors of this report. Attendees of the workshop included most of the individuals interviewed for this research and other stakeholders and agencies involved with transportation in California and/or in each of the corridors under study. The total number of participants was 38. A list of participants (by organizational affiliation) is provided in the appendix, along with the workshop agenda.

The aim of the workshop was to foster the exchange of lessons learned across different regions of the state. The workshop structure mirrored the structure of this report. We from UC Davis started off by introducing the findings of our research. Speakers involved with each of the four case studies (SR37, Living Shorelines, LOSSAN, and Port of Long Beach) then gave presentations. Then we had facilitated discussion groups (via a Zoom Breakout Rooms function), where speakers and attendees discussed the findings of the report and the presentations they had just heard. We assigned attendees to breakout rooms to maximize the variation in the composition of the groups, to make sure that individuals from different regions interacted with each other. The last part of the workshop consisted of presentations by personnel involved in three of the four cases outlined in Section 4. In the following paragraphs, we outline the key insights emerging from the workshop, under headings mirroring the discussion questions we posed to attendees. We refer to the individual presentations where relevant.

5.1 Attendees' discussion groups.

The four breakout rooms were asked to discuss three discussion questions:

- 1) **Relevant stakeholders.** What is a 'relevant' stakeholder and how to identify all relevant stakeholders?
- 2) **Jurisdictional bridging.** How to structure collaborative processes involving multiple local jurisdictions? Should collaboration be mandated?
- 3) **Funding.** In what ways can collaboration be leveraged to obtain funding?

5.1.1 Relevant stakeholders: who are they and how to involve them in the collaborative process?

Participants discussed the difficulty posed by jurisdictional overlaps between multiple local governments or agencies at different levels of governance, each following different procedures and having different missions. Participants also mentioned the challenges involved with diffusing information about climate change and its impact on transportation infrastructure to

the general public. Non-profit organizations were recognized as crucial actors in the collaborative process, particularly as they work closely with local communities. Finally, the inclusion of environmental justice groups and groups representing disadvantaged communities was mentioned as pivotal to successful adaptation.

Several attendees emphasized the temporal dimension of collaboration: trust and collaboration develop over time; collaboration solidifies over time, on a project-by-project basis. It is important to engage relevant stakeholders early and often to foster their sense of ownership of the process and support collaborative relationships over time. Several attendees suggested that more funding should be directed to involving community actors with no means to engage otherwise, and for substantial periods of time, to allow trust to form.

Filling information gaps is considered the main target of collaborative governance processes. Therefore, identifying and involving actors with useful information for the project is essential to its success. The presence of well-connected and influential actors is seen as important to facilitate collaboration. There was a lot of discussion concerning the difference between actors who take part in many different forums and actors whose participation is more intermittent and/or focused on one specific forum. This difference suggests the need to be strategic about who to involve in the collaborative process and at what stage. This is seen as important to balance involvement with sustained engagement.

As for practical strategies addressing the challenges of involvement and engagement, the SR37 case provided a prime example. In this case all relevant stakeholders were invited to take part in the meetings, respond to consultations and provide their input (the stakeholders involved call this approach the “Big Tent approach”). Another idea that emerged from discussion proposed the establishment of regular “check-ins” with stakeholders on projects, to help reduce back and forth or too much communication. While it is important to bring all stakeholders to the table in the early phases of a project to hear their preferences, later, a divide might naturally emerge between external and internal stakeholders; the latter are fully involved in all phases of the project and have specific roles and functions within it. External stakeholders should receive regular updates (or “check-ins”) so that they do not need to attend all the project meetings. Given the scale of transportation projects and the myriad actors involved, the appointment of a Project Manager/Corridor Director can help sustain engagement, tie the various parts of the project together, and make cross-jurisdictional, multi-benefit projects move forward.

Moreover, among the lessons learned, structuring the collaboration in tiers and/or with a Memorandum of Understanding is considered essential to: set expectations; manage the flow of communication; resolve issues at appropriate level; and deal with the multi-level nature of the governance system, the cross-jurisdictional aspects of projects, and the multiple interlinked issues (governance, geographic, permitting, designing etc.) related to the project.

Further, stakeholder engagement in relation to scientific communication can lead to the best possible project. Engagement helps communicate science to policy-makers and public managers, as well as the public, fostering support for adaptation projects.

5.1.2 Jurisdictional bridging: how to structure collaboration involving local jurisdictions?

In the discussion concerning this question, participants reiterated the importance of early engagement and emphasized the advantage of tapping into existing relationships and networks. The development of trust is seen as even more crucial for collaboration between local jurisdictions. In this regard, state leadership was mentioned as pivotal to the emergence of collaboration. The presentation and discussion concerning the Living Shorelines project explicitly recognized the importance of state leadership for addressing the problems of Highway 1 at Encinitas. Indeed, funding for the Living Shorelines came from the Ocean Protection Council and the Coastal Conservancy, and early involvement of the California State Parks and Coastal Commission was crucial to the success of the collaboration.

Political leadership is needed to overcome a standstill in the collaboration. The case of the LOSSAN railroad outlined the long-standing vulnerability of the corridor to bluff erosion and the long-standing collaboration between SANDAG and NCTD in addressing it. If the success of the Living Shorelines case can be ascribed to constructive collaboration between state agencies and local governments, the case of the LOSSAN railroad underscores the importance of political leadership in prompting all relevant parties to sit at the same table to formulate a strategy to attain funding. Although stabilization efforts for the corridor started in the late 1990s and the relevant stakeholders have been interacting ever since, there was no collaborative framework bringing all of them together before the intervention of the San Diego representative to the California Transportation Commission, Christine Kehoe. Her involvement was prompted by the major bluff collapse that occurred in November 2019. She subsequently requested a working group be formed to leverage funding for the corridor.

Manifestations of leadership usually follow highly visible unfortunate events. In all the cases under study, the vulnerability of the relevant transportation asset to flooding and/or erosion predates concerns about sea level rise. In all cases, except the Living Shorelines, a single focusing event appears to have catalyzed political or managerial and public attention to the corridor/asset: the 2017 and 2019 flooding events for SR37; the November 2019 collapse of the Del Mar bluffs for LOSSAN; the disruption by Hurricane Marie in 2014 for the Port of Long Beach.

As for the practical strategies that public managers themselves can deploy to foster collaboration across jurisdictions, several participants noted the importance of framing and phrasing projects using language that emphasizes their multi-beneficial nature for different purposes and, therefore, constituencies/groups. It is important that the project presentation lays out the trade-offs involved and what plans are in place to overcome them. Collaboration between regulatory agencies needs to proceed alongside efforts to reach out to non-governmental actors and the public. Participants mentioned the successes in engaging the broader public thanks to social media strategies. These, however, are not a panacea as internet access is limited in some areas.

5.1.3 Funding: how can collaboration be leveraged to raise funding?

The third discussion question was the least discussed due to time limitations. The first two questions—focused on collaboration—occupied most of the time allocated to the discussion groups. However, attendees underlined the necessity of state or federal sources of funding able to match resources collected at the local level (or, in the case of the Port of Long Beach, complementing the Port’s own capital improvement budget). One key concept discussed is that funding bodies prefer (or outright require) projects to be embedded in collaboration to ensure that they are ‘getting the biggest bang for the buck.’ In other words, funding bodies want to make sure that their investments are cost effective; if a given project is underpinned by broad stakeholder consensus, it is less likely to get delayed or face implementation problems; also, if a project achieves several purposes at the same time, it is considered more likely to get funded as several objectives are accomplished at once.

5.2 Progress made by SB1 grant recipients.

The workshop concluded with three final presentations from recent SB1 recipients. The Highway 1 project in Marin County has made considerable progress in terms of assessing options to limit flooding to Shoreline Highway and repair the Bay Trail. The County has been working alongside Caltrans and the municipalities in the project area. The project is heavily focused on public engagement. These plans are at risk of being thwarted by the COVID-19 pandemic.

San Mateo County is similarly heavily focused on public and community engagement in identifying priority transportation assets for adaptation options. The Office of Sustainability has also been assessing vulnerabilities and laying out various options to respond to several climate change threats, including heat.

SANDAG has completed nine interviews with local planners and has published its guidance document outlining adaptation pathways for the region. Local planners underlined the importance of making sea-level rise visible to the public in order to garner support for policy measures addressing adaptation.

SCAG apologized for not being able to present at the workshop due to resource constraints.

6 Conclusions

The consequences of climate change are felt primarily at the local level (or at the level of the metropolitan region) (Huitema, Adger et al. 2016) and are, to an extent, inevitable. The aim of this research is to provide public managers in California with examples of one of the least explicitly discussed, and yet most important issues in climate adaptation: collaboration. This work branches out from a project similarly focused on governance and sea level rise but concerning the Bay Area (Lubell 2017, Lubell, Vantaggiato et al. 2019), with no specific sectoral focus. With this project, we intended to focus on governance issues in a specific sector, at the local level, concerning specific infrastructure corridors sharing three key characteristics: 1) being vulnerable to sea level rise; 2) lacking alternative routes; 3) being the focus of a governance process. We decided to adopt a comparative approach to show public managers that, despite the considerable differences that exist between different areas of California, there are lessons to be learned from juxtaposing cases in a way that focuses on commonalities of challenges and differences in approaches.

We centered our research around the notion of learning: on the one hand, our goal was to distill lessons learned that public managers (i.e., local government staff such as planners, project managers, outreach managers, etc.) can adopt to address governance challenges. On the other hand, we wanted to emphasize the importance of collaboration as a learning process for those involved. Collaborative governance processes foster learning of technical knowledge as well as learning aimed at strengthening or revising one's policy-related beliefs (Leach, Weible et al. 2013). When learning results in a convergence of beliefs among stakeholders, it can ultimately lead to consensus and, therefore, action. Naming a process as collaborative, however, is not sufficient; fairness and trust, as well as inclusion of diverse stakeholders, are essential ingredients (Leach, Weible et al. 2013).

The findings of this research support the claims of the literature: the most successful collaborative process we examined—the Living Shoreline project in Encinitas in San Diego County—is the only one where all the components necessary for learning were present: there was a facilitator, early involvement of all relevant participants, structured collaboration, regular interaction, and open sharing of information (Gerlak and Heikkila 2011). As a result, participants perceived the process as fair. Meanwhile, knowledge acquisition also occurred as the project involved an innovative combination of sand dunes and rock revetment, reaching the twin goals of restoration, access preservation, and protection of the road in the medium term.

The other cases we examined lacked at least one of these elements. The SR37 case did not involve all relevant stakeholders from the start, although it does now, and appears to lack cohesive leadership. Although planning for its stabilization has been going on since the early 2000s, the LOSSAN corridor has become the focus of a collaborative process only very recently. The Port of Long Beach has completed the assessment of their vulnerabilities and has since begun coordination with some key agencies at the local level (interviews). The projects funded under SB1 grants displayed differences: the projects in Marin and San Mateo Counties focus on the local level and are embedded in close collaboration with and between local stakeholders;

the projects in Southern California are regional in scope and aim to foster closer cross-jurisdictional collaboration between local governments. Southern California stakeholders and agencies can and should look at the accumulated experience of the Bay Area counties in terms of bringing adaptation issues to the public and creating forums of interaction for local communities.

Indeed, we flagged jurisdictional fragmentation as an important governance challenge. Structuring collaboration across levels ranging from technical to executive has emerged as a suitable and effective strategy to ensure exchange of information and negotiations between local governments. In contrast, memorandums of understanding appeared to be the preferred means of structuring collaboration when the process involves actors from different levels of governance. Both instruments appear useful insofar as they are able to clarify the aims of the collaboration and the expectations of the actors involved, without being overly constraining. The creation of a dedicated platform for interaction (e.g., a Working Group, Committee, or Task Force) with regard to sea level rise further helps focusing participants' efforts. As shown by current projects funded under SB1, cross-jurisdictional issues will soon surface in Southern California, as SANDAG and SCAG are taking their first steps in fostering dialogue among local jurisdictions. We hope that the findings presented in this report will be useful for them as they undertake this task.

Climate adaptation connects all levels of governance, from federal to state, regional, and local. The practice of climate adaptation, however, is a local governance process (Preston, Mustelin et al. 2013). In California, local level public managers face considerable hurdles in fostering coordination across jurisdictions (Mazmanian, Jurewitz et al. 2013). With this research, we sought to name and emphasize such challenges, collect information on how they were addressed in practice, and foster the beginning of a conversation around adaptation to sea level rise in transportation that bridges across regions and levels of governance.

References

- Aerts, J. C., P. L. Barnard, W. Botzen, P. Grifman, J. F. Hart, H. De Moel, A. N. Mann, L. T. de Ruig and N. Sadrpour (2018). "Pathways to resilience: adapting to sea level rise in Los Angeles." Annals of the New York Academy of Sciences **1427**(1): 1–90.
- Barnard, P.L., Erikson, L.H., Foxgrover, A.C., Limber, P.W., O'Neill, A.C., and Vitousek, S., 2018, Coastal Storm Modeling System (CoSMoS) for Southern California, v3.0, Phase 2 (ver. 1g, May 2018): U.S. Geological Survey data release.
- Beagle, J., J. Lowe, K. McKnight, S. M. Safran, L. Tam and S. J. Szambelan (2019). San Francisco Bay Shoreline Adaptation Atlas: Working with Nature to Plan for Sea Level Rise Using Operational Landscape Units., SFEI Contribution.
- Bennett, C. J. and M. Howlett (1992). "The lessons of learning: Reconciling theories of policy learning and policy change." Policy Sciences **25**(3): 275–294.
- Dolšák, N. and A. Prakash (2018). "The Politics of Climate Change Adaptation." Annual Review of Environment and Resources **43**(1): 317–341.
- Dunlop, C. A. and C. M. Radaelli (2018). "Does Policy Learning Meet the Standards of an Analytical Framework of the Policy Process?" Policy Studies Journal **46**: S48–S68.
- Dunlop, C. A. and C. M. Radaelli (2018). "The lessons of policy learning: types, triggers, hindrances and pathologies." Policy & Politics **46**(2): 255–272.
- Ekstrom, J. A. and S. C. Moser (2014). "Identifying and overcoming barriers in urban climate adaptation: Case study findings from the San Francisco Bay Area, California, USA." Urban Climate **9**: 54–74.
- Folke, C., T. Hahn, P. Olsson and J. Norberg (2005). "Adaptive governance of social-ecological systems." Annu. Rev. Environ. Resour. **30**: 441–473.
- Gerlak, A. K. and T. Heikkila (2011). "Building a Theory of Learning in Collaboratives: Evidence from the Everglades Restoration Program." Journal of Public Administration Research and Theory **21**(4): 619–644.
- Hall, A., N. Berg and K. Reich (2019). California's Fourth Climate Change Assessment - Los Angeles Region Report.
- Heclo, H. (1974). Modern social politics in Britain and Sweden from relief to income maintenance. New Haven, Yale University Press.
- Heikkila, T. and A. K. Gerlak (2013). "Building a Conceptual Approach to Collective Learning: Lessons for Public Policy Scholars." Policy Studies Journal **41**(3): 484–512.
- Huitema, D., W. N. Adger, F. Berkhout, E. Massey, D. Mazmanian, S. Munaretto, R. Plummer and C. C. J. A. M. Termeer (2016). "The governance of adaptation choices, reasons, and effects. Introduction to the Special Feature." Ecology and Society **21**(3).

- Johnston, E. W., D. Hicks, N. Nan and J. C. Auer (2011). "Managing the Inclusion Process in Collaborative Governance." Journal of Public Administration Research and Theory: J-PART **21**(4): 699–721.
- Kalansky, J. and D. Cayan (2019). California's Fourth Climate Change Assessment - San Diego Region Report.
- Leach, W. D., C. M. Weible, S. R. Vince, S. N. Siddiki and J. C. Calanni (2013). "Fostering Learning through Collaboration: Knowledge Acquisition and Belief Change in Marine Aquaculture Partnerships." Journal of Public Administration Research and Theory **24**(3): 591–622.
- Lewis, P. G. and M. Sprague (1997). Federal Transportation Policy and the Role of Metropolitan Planning Organizations in California, Public Policy Institute of California.
- Lubell, M. (2017). The Governance Gap: Climate Adaptation and Sea-Level Rise in the San Francisco Bay Area, University of California, Davis.
- Lubell, M., F. Vantaggiato and D. Bostic (2019). The Governance of Sea Level Rise in the San Francisco Bay Area: results from a survey of stakeholders, University of California, Davis.
- Mazmanian, D. A., J. Jurewitz and H. T. Nelson (2013). "The Paradox of "Acting Globally While Thinking Locally":Discordance in Climate Change Adaption Policy." The Journal of Environment & Development **22**(2): 186–206.
- Ocean Protection Council (2018) State of California Sea Level Rise Guidance, 2018 update.
- Olson, M. (1965). The Logic of Collective Action. Public Goods and the Theory of Groups, Harvard University Press.
- Preston, B. L., J. Mustelin and M. C. Maloney (2013). "Climate adaptation heuristics and the science/policy divide." Mitigation and Adaptation Strategies for Global Change **20**(3): 467–497.
- Putnam, R. D., R. Leonardi and R. Y. Nanetti (1993). Making democracy work: Civic traditions in modern Italy, Princeton University Press.
- Rose, R. (1993). Lesson-drawing in Public Policy: A Guide to Learning Across Time and Space, Chatham House Publishers.
- Schmitt, S. (2012). Comparative approaches to the study of public policy-making. Routledge Handbook of Public Policy, Routledge.
- Scott, T. A. and C. W. Thomas (2017). "Unpacking the Collaborative Toolbox: Why and When Do Public Managers Choose Collaborative Governance Strategies?" Policy Studies Journal **45**(1): 191–214.
- Shilling, F. M., J. Vandever, K. May, I. Gerhard and R. Bregoff (2016). "Adaptive Planning for Transportation Corridors Threatened by Sea Level Rise." Transportation Research Record **2599**(1): 9–16.
- Vogel, D. (2018). California Greenin': How the Golden State Became an Environmental Leader. Princeton NJ, Princeton University Press.

- Wang, R.-Q., M. T. Stacey, L. M. M. Herdman, P. L. Barnard and L. Erikson (2018). "The Influence of Sea Level Rise on the Regional Interdependence of Coastal Infrastructure." Earth's Future **6**(5): 677–688.
- Weible, C. M., T. Heikkila and J. Pierce (2018). "Understanding rationales for collaboration in high-intensity policy conflicts." Journal of Public Policy **38**(1): 1–25.

Appendix

List of interviewees

For reasons of anonymity, this list reports only the names of the organizations where the people interviewed for this research worked. The fourth column lists the number of interviewees per each organization. In some instances, several individuals from the same organization took part in the same interview; in other instances, we carried out several interviews with representatives of the same organizations in different dates, as indicated by a row for those organizations being split in columns 4-6.

Table 4. List of organizations interviewed for this research

Organization	Region	Type of Organization	Number of interviewees	Date(s) of interview	Type of Interview
Bay Area Regional Collaborative (BARC)	Bay Area	Public Sector	1	12-Oct-19	Phone
Bay Conservation and Development Commission	Bay Area	Public Sector	1	23-May-19	Phone
Marin County	Bay Area	Public Sector	1	19-Mar-19	In-person
			1	14-Aug-19	In-person
Metropolitan Transportation Commission (MTC)	Bay Area	Public Sector	1	30-Jan-20	Phone
San Mateo County	Bay Area	Public Sector	1	14-Aug-19	Phone
Transportation Authority of Marin	Bay Area	Public Sector	2	18-Mar-19	In-person
Aquarium of the Pacific	Los Angeles	Public Sector	1	6-May-19	Phone
City of Los Angeles	Los Angeles	Public Sector	3	2-May-19	In-person
City of Los Angeles District 11	Los Angeles	Public Sector	2	22-Apr-19	In-person

Organization	Region	Type of Organization	Number of interviewees	Date(s) of interview	Type of Interview
Climate Resolve	Los Angeles	Non-governmental organization	1	15-May-19	Phone
LA Metro	Los Angeles	Public Sector	1	2-May-19	In-person
Los Angeles Regional Collaborative	Los Angeles	Other	2	22-Apr-19	In-person
Port of Long Beach	Los Angeles	Public Sector	1	15-May-19	Phone
			4	12-Aug-19	In-person
Southern California Association of Governments (SCAG)	Los Angeles	Public Sector	1	22-Apr-19	In-person
California State Coastal Conservancy	State	Public Sector	2	5-Aug-19	Phone
United States Geological Service (USGS)	Federal	Public Sector	1	2-May-19	In-person
Local Government Commission	State	Public Sector	1	20-Dec-19	Phone
City of Del Mar	San Diego	Public Sector	1	15-May-19	Phone
			1	8-Aug-19	In-person
City of Encinitas	San Diego	Public Sector	2	1-May-19	In-person
North County Transit District (NCTD)	San Diego	Public Sector	1	8-Aug-19	In-person
				19-Aug-19	Phone
Port of San Diego	San Diego	Public Sector	1	15-May-19	Phone
				7-Aug-19	In-person

Organization	Region	Type of Organization	Number of interviewees	Date(s) of interview	Type of Interview
San Diego Association of Governments (SANDAG)	San Diego	Public Sector	3	19-Apr-19	In-person
San Diego Regional Collaborative	San Diego	Other	1	18-Aug-18	Phone
				30-Apr-19	In-person
Scripps UC San Diego	San Diego	Other	2	20-May-19	In-person

Table 5. List of policy meetings attended for this research

Meetings attended	Meeting date	Type of participation
SR37 meeting in Vallejo	20-Jul-18	In person
SR37 meeting in Vallejo	8-Nov-18	In person
Bay Conservation and Development Commission sub-regional meeting on sea level rise in Vallejo	5-Feb-19	In person
SR37 meeting in Novato	7-Mar-19	In person
SR37 meeting in Petaluma	6-Jun-19	In person
SANDAG meeting with the cities	8-Aug-19	In person
SCAG 3rd meeting of the Resilience and Adaptation Working Group	17-Oct-19	Online
SCAG Regional Planning Working Group meeting	21-Nov-19	Online
SCAG Financing the Future Workshop	12-Dec-19	Online

Workshop Agenda



Center for Environmental
Policy & Behavior

Learning to collaborate: lessons learned from governance processes addressing the impacts of sea level rise on transportation corridors across California.

Final Agenda

Thursday, April 23, 2020

8:45 am - 1:00 pm PDT

- | | |
|-------------------|---|
| 8:45 a.m. | Virtual Coffee

Brew some coffee and say hello to other workshop participants |
| 9:00 a.m. | UC Davis Report Findings and Recommendations

Sea level Rise and transportation: governance challenges across California
Francesca Vantaggiato and Mark Lubell, University of California, Davis |
| 9:30 a.m. | Highway 37: Challenges, Opportunities, and lessons learned from the governance process
Nick Nguyen, Transportation Authority of Marin (TAM)

Allison Brooks, Bay Area Regional Collaborative (BARC) |
| 10:00 a.m. | Break |
| 10:15 a.m. | San Diego Case Study: Highway 1 in Encinitas

Kathy Weldon, (formerly) City of Encinitas |
| 10:30 a.m. | San Diego Case Study: The LOSSAN railroad at Del Mar: An unfolding governance process

Alexandra DeVaux, San Diego Association of Governments |
| 10:45 a.m. | Los Angeles Case Study: Sea Level rise concerns for critical transportation assets

Justin Luedy, Port of Long Beach |
| 11:00 a.m. | Breakout Rooms

<i>Discuss cases along provided discussion questions below.</i> |

- 11:45 a.m. Break**
- 12:00 p.m. San Diego Area: Regional collaboration for Sea Level Rise of SANDAG**
Sarah Pierce, San Diego Association of Governments (SANDAG)
- 12:15 p.m. San Mateo County: Climate Ready SMC Collaborative**
Marcus Griswold, San Mateo County
- 12:30 p.m. Marin County: transportation scenarios and strategies for sea level rise**
Chris Choo, Marin County
- 12:45 p.m. Final Conclusions**
- 13:00 p.m. Meeting Adjourns**
- Breakout** 1. **Relevant stakeholders.** What is a ‘relevant’ stakeholder and how to identify all relevant stakeholders?
- Discussion**
- Questions:** 2. **Jurisdictional bridging.** How to structure collaborative processes involving multiple local jurisdictions? Should collaboration be mandated?
3. **Funding.** In what ways can collaboration be leveraged to obtain funding?

Workshop Participants by organizational affiliation

BARC (presenter)
 BCDC (four participants)
 Caltrans (seven participants)
 Coastal Conservancy (three participants)
 ITS (organizers, four participants)
 Marin County (two participants, of which one presenter)
 North County Transit District (one participant)
 Port of Long Beach (presenter)
 San Mateo County (presenter)
 SANDAG (three participants, of which two presenters)
 SBC Global
 SCAG
 Transportation Authority of Marin (two participants, of which one presenter)
 UC Davis (authors of this report)
 University of Southern California (two participants)
 USGS (two participants)
 Consultant (presenter)